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NEGATIVE BY
THEO. ECKELMANN,
BREMEN, GERMANY.

"A STUDY IN POSING."

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EIGHTEEN HUNDRED AND NINETY-TWO.

"A PROSPEROUS NEW YEAR" is our greeting and wish to all our readers, subscribers, and patrons, as well as to the *personnel* of the JOURNAL.

The many complimentary expressions and notices, the additions to our subscription list, and the demand upon our advertising pages during the past year, have all been signs of encouragement to us, showing the appreciation of our efforts, and proving the fact that no change was necessary. Consequently we will endeavor to keep the JOURNAL up to its present standard, in the interest of photography in its widest sense, and keep our readers thoroughly acquainted with everything bearing upon the art, both foreign and domestic; at the same time keeping, as heretofore, independent in all matters, free from any factional entanglements.

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FERROTYPES.

BY ELLERSLIE WALLACE.

IF we were asked to give the name of a class of photographic pictures returning handsome profits, and which could be finished easily and quickly, we should say the ferrotype.

We mean by this the old-fashioned ferrotype or collodion positive on thin japanned iron, not the ferro-prussiate or "blue" print, which is sometimes confounded with the former.

A rather startling story made its appearance in one of our recent English contemporaries, to the effect that dry ferrotype plates requiring but very short exposures were now articles of commerce. We have not yet seen them, but should welcome the introduction of such plates if they could be manufactured and sold at reasonable prices. But there are serious difficulties in the way; and to make clear why they are so we shall devote a few moments to a description of the ferrotype picture.

We have just said that the ferrotype was a collodion positive. Now by this we do not mean a transparent positive like the ordinary lantern slide, but a thin, delicate negative image, which, when looked at by reflected light, gives a positive picture, the clear shadows of the negative being black from the black backing with which these positives are always mounted. The deposit of silver which forms the opaque portions of a negative becomes brilliantly white when properly developed, and constitutes the high lights of the picture. It must be borne in mind that the positive is never regarded by transmitted light like the negative. In a certain sense, then, the positive may be called a weak negative.

Space forbids our giving a historical account of this pleasing variety of photograph, but we may say that it is a relic of the old ambrotype of glass or Niellograph on black cardboard. At first ferrotypes were known under the name of Melainotypes, the iron plate having been introduced as a substitute for the black cardboard, which was inconvenient to dip into the silver bath.

Ferrotype plates require no cleaning. They are packed in boxes, with a piece of clean paper between each two, which preserves the delicate surface. Nothing but the lightest touch with a camel's-hair brush is required before coating with collodion. Ordinary negative collodion is too thick and heavy for the purpose, and must be thinned down—say one-quarter or one-third—with ether and alcohol. If a collodion be purposely made, select a white, long-texture cotton, using not more than four or four and a half grains to the ounce, and reduce the salting to about the same figure,—say three grains of iodide and one or one and a half grains of bromide per ounce.

The bath may be about forty grains strong, with acid enough to give perfectly clean whites. The slighest fog or veil will be very observable in the finished picture. The plate should not be hurried out of the bath before the liquid runs perfectly smooth from its surface. Oily lines will leave a stain when the developer is applied.

The most convenient way of dealing with the ferrotype plate after it leaves the bath is to put it right into the holder after draining off the silver solution as closely as possible, and to lay a piece of clean glass of the same size in behind it. This keeps the plate flat during exposure, and the two are separated for a moment only, just before developing, so as to drain off again the last drops of silver collecting during the exposure. This will insure freedom from stains. The exposed plate being again laid on the glass, the following developer is applied if "dead whites" are desired:

Sulphate of iron, ...	6 ounces.
Water, ...	80 ounces.
Acetic acid, No. 8, ...	8 ounces.
Alcohol, ...	6 ounces.

We ourselves have always preferred the following formula, however, on account of the brilliancy of the whites it gives. Although a trifle slower in action than the above, the results are more pleasing to the average customer, though, of course, the question of "dead whites" *versus* "brilliant whites" is one of individual taste.

Sulphate of iron, ...	6 ounces.
Acetic acid, No. 8, ...	6 ounces.
Alcohol, ...	8 ounces.
Nitrate of silver, ...	40 grains.
Pure nitrate of potash, ...	1 ounce.
Water, ...	80 ounces.

A complicated mess! some one may say. Perhaps it may seem so, but we know that it does the work well. Let us remark, that since the alcohol is only intended to make the developer flow smoothly, the quantity might be reduced with a new bath. The best way to add the nitrate of silver is to set aside a couple of ounces of the water, dissolve the nitrate in it, and add to the developer after all the other articles are incorporated. The decomposition of the nitrate of silver by the iron liberates a trace of nitric acid which aids in conferring brilliancy upon the whites of the picture.

Both of the developers mentioned give better results when a little "aged" and reddened. In winter time the bath and developer should not be allowed to become icy cold, or the picture will be covered with spangles of metallic silver. Some experience will be necessary to tell just when to stop the development. After a wash under the tap, the picture is fixed in a ten or fifteen-grain solution of cyanide of potassium, and there are few prettier things in photography than the instantaneous reappearance of the picture in all its cleanness and perfectness when fixed, after the sort of burying-up it undergoes during the development.

If the customer is impatiently waiting for his picture, the whole process of development, fixing, washing, dying, and mounting in a suitable frame or "preserver" need not occupy more than a very few minutes. The picture may be dried over a lamp or before the fire until it actually steams, and no fear be felt that the film will melt. If glass be laid over it in the frame even varnishing may be omitted, though we do not advise this. Let us say, in conclusion, that the great cheapness of this useful process is only to be equaled by the ease and expedition of the finishing, and that the results are second to none in permanency.

POSING AND COMPOSITION, WITH ESPECIAL REFERENCE TO THE ACCESSORIES.—II.

BY XANTHUS SMITH.

THE artistically inclined photographer, be he professional or amateur, has always an admirable resource in the use of drapery in composing his backgrounds.

Drapery gives us a greater range of agreeable effects than anything which may be used in its reality. Indeed, it may be said that it almost always comes into good advantage as a backing or part backing, either for single figures or groups; and as it may be selected of such hues as will take just the degree of importance which it is desirable that it should in forming the light and dark of the work, it in a measure substitutes painted backgrounds. It may be cast at the moment, with all the elegance of design with which the artist is capable of disposing it. With the painter his drapery is a matter of much solicitude, and hours are often spent in making casts of it to secure a very fine disposition. The charm of drapery as portrayed in photography consists in its beautiful variation of lines through all the varieties of right line and curve, as expressed in light and shadow; and if the folds be properly cast, these lines and sweeps are always agreeably contrasting each other. We have only to look at the work of the best photographers to see how beautifully it is portrayed by photography, and what a useful part it plays in their portrait and figure subjects.

Useful, however, as drapery is, and harmonious as are the effects produced by it when judiciously used, it may become very objectionable if allowed to run into long, straight, parallel folds of equal breadth, as it is very apt to do, or into portions of circles instead of elliptic sweeps. There should be a predominance of flat folds, making the whole softer and less obtrusive. A number of very deep parallel and equally spaced folds will make it so stiff and harsh and obtrusive, under a strong lighting, that nothing much worse could appear in a background. It should not be of too deep a color, or of a texture that does not light up well, as in the latter case it becomes heavy and overpowering. Nor should it be

equally disposed on both sides of the picture. A much greater predominance should be given either to one side or the other; in fact, it is generally seen to the best advantage when contrasting a plain opposite.

The matter of weight, or balance as painters express it, of the two sides of a picture is one of great importance. The error is too often run into of crowding both sides of a picture or background with an equal quantity of objects, it being forgotten that the eye craves repose in some portion of the work. Do not, however, run into the contrary error of loading up one side of the composition and leaving the other perfectly bare, or you lose the proper balance, the crowded side appearing too heavy for the blank side, and making the latter look bald. Contrive to get some small amount of interest on the side that is to be of least importance.

It is a good plan, in practice, to bear constantly in mind that there must be a gradation in the scale of importance of the objects which constitute a picture. The sitter or group, if there be more than one, should of course decidedly take precedence over all the rest. Then there should be a second or supporting group, and properly a third and even a fourth dying-off spot of interest. Curtains, columns, balustrades, tables, chairs, vases, and various objects of virtu readily furnish us with the material for these secondary features, and we must at the outset determine which of these we will select to play second, third, and so on to our sitters. It will be obvious that to introduce them all prominently placed and conspicuously lighted would destroy the aim and repose of the work.

It must be remembered that I am now writing of efforts in the direction of artistic arrangements. There is much useful work done in photography in the way of views of apartments with their everyday contents. These are generally not pictures, however, but simple records of actual facts, interesting chiefly to the individuals for whom they were made.

I am sorry that I cannot accompany my remarks with illustrations, as a few examples would do much towards quickly making clear the observations set forth; but I would recommend that all

who may have it in their power to do so should look at works of art, preferably simply in light and dark, as the chiaro-oscuro may be better judged of without the presence of color, and at the work exhibited by the best photographers, carefully comparing and weighing one work with another, and they will in this way both perceive the truth of the best principles of composition and light and shadow, and secure valuable hints to assist them in their difficult work.

One great advantage which the painter possesses over the photographer is that he is generally able to so arrange the costume of his figures that he may get the upper portion relieved light off dark, and the lower portion dark against light, and *vice versa.* Nothing is more destructive of an agreeable effect in a picture, or gives so dry and stiff an appearance, as to see principal objects relieved from top to bottom dark against an evenly light background or light against a correspondingly dark background. Why it should be so is not easily to be explained; but we have only to compare a photograph of a person posed at full length, or even half-length, in very dark garments against a light background, with one in which the costume or the background have been so varied as to make less equal relief, to see how hard and dry the former is as compared with the latter, in which some art has been used to attain variation. Yet this is a difficulty that the photographer must daily encounter. Men are constantly presenting themselves in light or dark suits from head to foot, and ladies in black dresses, occasionally velvet, and white silk and satin dresses. One of the most imposing subjects to be dealt with by the photographer is the lady in her white wedding suit. Now, what can he do? The only thing seems to be to lose either the upper portion or the lower, preferably the latter, in the background. By this art and the use of a background that will not give too great a contrast, we may do a vast deal towards overcoming this objectionable quality of equal relief and stiffness in a work. In varying the depth of the background, however, care must be taken not to let the change from light to dark be too sudden, thus bringing the opposing shades together so as to form an abrupt termination, and giving rise to an objectionable

line up and down or across the picture. As with the best-painted backgrounds, the light portion should melt into the dark, and diagonally instead of horizontally, making the greatest variation of tint at the upper and lower right and left-hand corners, instead of equally across the top and bottom, of the background.

When there are no backgrounds at command, drapery is the most useful substitute, and it should be so disposed and lighted as to attain the aim of destroying equal relief. By placing dark drapery back of the dark or shaded side of the figure, we may lose, in a measure, the outline of that side; or by placing it back of the light side we may get a relief of light which will give a different and consequently more picturesque contrast.

In the use of drapery it can never be said that there is anything far-fetched or out of place about it, as can of many objects that are used in the composition of backgrounds. Curtains and hangings of various kinds are so much the rule in the furnished apartments of civilized life that they always appear in place, and especially well do elegant draperies come in in poses of ladies, the look of finish, harmony, and comfort all contributing to the general effect of completeness. We may say, too, and especially to the amateur, that drapery of some art or other is one of the easiest things to be laid hold of. For those who cannot attain fine hangings plenty of cheap substitutes are to be had, down through canton flannel to soft muslins of various shades,—even an old gray shawl has done good service in a simple subject when nothing better was at hand. If at all situated so as to have access to the work exhibited by the best photographers, you have only to look it over carefully to see how much excellent use is made of draperies of various kinds in giving variety to what would otherwise be bald spaces of background, and getting varied relief in the lights and darks, and in breaking up stiff, awkward lines of architectural and other features. I have seen in a sitting female pose all the objectionable angularity and hardness taken out of a rosewood chair by a soft light shawl being thrown over a portion of it.

I recommend looking at the work of professional photographers because they are compelled to deal with art in its relation to the actual facts as they daily present themselves to the photog-

rapher. I would by all means, as I said before, advise studying, whenever opportunity affords, good works of art, and storing up for use every hint that may be obtained from them; but, unfortunately, owing to the effect attained being so fully at the will of the artist, a vast deal cannot be applied from painting or higher art teachings, and unless the essayist with the camera is considerably advanced in art and culture he is more likely to be confused than benefited if he wanders into the walks of higher art.

THE EFFECT OF TEMPERATURE ON DEVELOPMENT.

AS the winter season is now once more upon us, and we may expect spells of intensely cold weather, with their usual annoyances to the photographer, we reproduce the following paper, published during the past winter in the *British Journal of Photography*, which should be carefully read and noted by every professional photographer.

The coming winter season will produce, no doubt, the usual crop of trouble in many quarters, but perhaps in no respect is greater annoyance caused than by cases of supposed under-exposure. The light at the present season is, under the most favorable circumstances, none of the best, but when still further reduced by fog and leaden skies the necessity for increasing exposures is forced upon every operator. And yet, when every reasonable allowance has been made, even when some form of actinometer is employed, and the exposure increased accordingly, in too many cases feeble images and lack of detail recur with exasperating persistency.

It is not unseasonable, therefore, to repeat the warning frequently given in the past, to look to the temperature, not only of the developing room itself, but also of the stock solutions, and especially of the water used in mixing the developer. It is not too much to say that plate makers receive more undeserved abuse and more failures are set down incorrectly to under-

exposure at this time of the year, or during the prevalence of such weather as we have had lately, than under any other circumstances, and solely in consequence of disregard of the altered conditions attending the lowered temperature.

How greatly the conditions of development are modified by a sudden change of temperature was brought forcibly under our notice a few days ago upon resuming the development of a number of plates exposed some six weeks ago, a portion only of which had been developed at the time, the remainder being left over. The exposures had all been short—a fraction of a second—but tolerably uniform, the subjects being all of a similar character, and so far as those previously developed were concerned, had proved sufficient when treated with a knowledge of the circumstances. On resuming development, however, pyro and ammonia failed entirely in giving anything but the merest ghost of an image; so we were fain to avail ourselves of the extra energy alleged to be one of the chief features of eikonogen, but even this in two or three trials fell short of producing the desired result.

It was then that the question of temperature forced itself on our attention; and here a peculiarity in connection with pyro and eikonogen development respectively made itself apparent. Whereas when the developing solutions were made up with water direct from the tap, and necessarily very cold, the difference between the images produced by the two agents was very pronounced when water tempered to about 65° Fahr. was employed, the results were practically identical, and negatives in every way equal to those obtained when the weather was warmer were obtained. This seems to establish the fact that development with pyro is far more powerfully influenced by the temperature of the solution than is the case with eikonogen, and suggested the question as to how hydroquinone compares with its rivals.

Hydroquinone, as we all know, is, under like conditions, far slower in its action than pyro or eikonogen; but a way out of this difficulty was put forward by some of its earlier friends in the recommendation to slightly raise the temperature, thus show-

ing that its susceptibility to this influence was fully recognized. Upon submitting plates similarly exposed to the action of the three developers, hydroquinone, as we were prepared to find, proved to be far more strongly influenced than either of the others, eikonogen, as already stated, being least so, and pyro occupying the midway position. Indeed, with an exposure that sufficed to give detail under treatment with eikonogen when mixed with water at a temperature but a few degrees above freezing point, hydroquinone, under similar conditions, appeared scarcely to possess any developing power at all. In view of the great and growing popularity of this developer in many quarters it is therefore of the very highest importance to bear this in view.

Another very curious point of difference between the behavior of pyro and eikonogen under variations of temperature may also be noticed. Some three or four years ago, in an article on the effect of temperature on development,—pyro alone being then referred to,—it was shown that given a sufficient exposure, a more vigorous result was produced by a cold developer than by one of higher temperature, and such also proved to be the case in our recent experiments. But with eikonogen a precisely reverse result was obtained. With a solution at the low temperature above alluded to, it was found impossible with any exposure, or with any strength up to ten grains of eikonogen to the ounce, to get anything beyond a thin, delicate image, while on raising the temperature to 60° or 62° full density was easily obtained with a solution of half the strength. Here, then, is another point it would be well to bear in mind.

With regard to the means to be adopted to remedy the evil of cold solutions, much will depend upon circumstances. The precautions that might satisfy an amateur or small worker would probably be insufficient or inconvenient in a large professional studio, while the elaborate arrangements suitable for work on a large scale would be altogether out of the question for the amateur. For the latter, perhaps, no greater refinement is needed than a jug of warm water with which to bring up the temperature of a second jug to the necessary point, and to use this for,

at any rate, mixing the developer and the fixing bath. The temperature of the washing water is a matter of minor importance, except in so far as it affects the expansion of the film; for it must be borne in mind that the use of solutions of varying temperature has been alleged to be a prolific source of frilling. This, however, was in days gone by, when frilling was a greater bugbear than it is at present.

Any method of working on a large scale should at least possess the advantage of being automatic,—that is to say, it should not require the constant attention of the operator to keep the temperature properly regulated. This, in the majority of cases, would fall in the domain of the hot-water engineer. But a very simple, and at the same time efficient, arrangement for a moderate-sized business is found in a small self-supplying cistern in the dark room, refilling itself, as used from, from the main or other source, and warmed by means of a properly protected gas-jet working in connection with a suitable thermostat or regulator. The best regulator for this purpose that we are acquainted with is that of Reichert, with which we have maintained an even temperature, without the variation of half a degree, for a period of three weeks. It costs but a few shillings, and is wonderfully sensitive, and can be set to any desired temperature.

Souvenir Spoons.—Every day we see more numerous and beautiful souvenir spoons brought into the market. A favorite method of obtaining a particular design, is to go to a regular artist and have him draw the inscription and design according to directions. If one is at all clever it is rather easy to etch the handles oneself. The spoon must be dipped in melted beeswax, and when the thin coating that the wax will form on the silver is entirely cold, trace the pattern on it with a needle firmly fixed in a penholder. A darning needle makes the fine lines, and a No. 9 sewing needle the finer ones. Mix one ounce sulphate of copper, one-quarter ounce alum, and half a teaspoonful of fine table salt with one gill of vinegar and twenty drops of nitric acid. Immerse the spoon in the mixture, remembering that the depth to which the acid will eat in the metal depends upon the length of time the article is left in the solution.

NEGATIVE RETOUCHE: HISTORY, OBJECT, NECESSITY.[1]

BY HANS ARNOLD.

(*Translated from the German by J. F. Sachse.*)

THE art of retouching, in common with the whole field of photographic practice, has reached its present high stage of perfection, in a comparatively short period of time, from a very small beginning. This is especially true respecting the retouche which from the time of its first application gained a foothold in all photographic circles throughout the world with lightning rapidity.

This development from the simplest technique to a complete branch of art has been so extraordinary that a retrospect of the short but significant development of this particular branch of professional photography will prove both interesting and instructive.

As our object is to confine ourselves to the negative retouche, we will commence our history with the time when negatives were first produced on glass, which, as our readers well know, was a considerable time after the discovery of photography. When photography was first discovered the discoverers never for a moment foresaw the great *rôle* which it was destined to fill in the future; else they (Victor Niepce, for instance) would have been less communicative and disinterested in publishing the discovery, and thus making it common property during their own time without gaining any special advantages or reward for themselves as individuals.

But with the negative retouche it was different. To return to the first stages of its development, the discoverers as well as those in the secret were well satisfied of its great value to photography and its pecuniary value. This discovery was not heralded openly throughout the world, but remained a secret,—a process and manipulation which was long sought for in vain.

[1] The Negative Retouche, According to the Laws of Art and Nature. By Hans Arnold. Vienna, 1891.

For a long time it was believed that the wonderful effects shown were the result of retouching the positive print. They were ascribed to a manipulation of the surface; but all attempts to wipe off the supposed manipulation upon the surface necessarily failed, as the effects were obtained by the negative retouche, about which the world at large knew nothing, the retouche then in vogue being merely a touching up of the finished silver print, which was easily washed off.

Many were the theories advanced regarding the fine, soft effects shown, intended to lift the veil of mystery. Pictures were examined with powerful magnifying glasses, learned papers read by prominent scientists,—all, however, without in the remotest manner hinting of any manipulation of the negative. During this excitement and controversy the shrewd inventors of the negative retouche remained behind their desks, laughed in their sleeve, and drew a pecuniary fortune from the ignorance of the photographers at large. A branch of the profession claimed to have been remunerative from the outstart. When at the present day we observe the negative retouche, in its universal application, from the standpoint of its great artistic efficiency and necessity, it is almost beyond belief that it is still in the state of incipiency. Yet, as a matter of fact, it merely dates back to the sixties of the present century.

The retouche in its widest sense is much older, as it dates back to the days of daguerreotypes; but on account of the material then in use it failed to give the beautifying results which the operator wished to obtain.

However, from the time when the graphite pencil asserted its mastery in the negative retouche, about the year 1866, a field of boundless scope and usefulness was opened, which from the outstart was received into public favor in all quarters.

As is usual in such cases, the users of the new process soon went to the other extreme. Exaggeration became apparent, especially as it was less trouble for the unconscionable workers, and required less artistic perception than the execution of the retouche according to the confined laws and rules required by true art and nature.

Among the earliest photographers who secretly made use of the negative retouche, we find the late O. G. Rejlander.

The honor of being the first to reveal the process of retouching the negative belongs to photographer Rabending, of Vienna, a man honored and respected everywhere in art and photographic circles.

It was he who introduced the celebrated portrait studies known as "The Vienna Heads," in the portraying of which no one ever equaled him at home or abroad. His superiority consisted solely in the artistic retouching of the negative.

Rabending did not at first make use of graphite points, but utilized the precipitate formed by adding ferrous sulphate and pyro to a dilute solution of nitrate of silver, which corresponded with the tone of the plates.

This precipitate he combined after washing, with any suitable medium, and used it by direct application to the negative with a fine stump or points of wood. He soon found himself obliged to abandon this method on account of the unsatisfactory nature of the results. This he did the more readily when he found that graphite gave even better effects.

He made no secret of his experiments with the graphite and thus contributed largely to the development of the negative retouche.

By his true artistic definition of the object of the retouche he at once became the guide of all such who strove to elevate the art of retouching by making it serviceable in the most correct manner. This object of the retouche is and can be no other than the production of artistic work with fidelity to the original.

While Rabending's artistic productions at once became the guide for the application of the negative retouche, the principles of his manner were formed into set rules for practical use, as the same principles were also discovered in the work of other early retouchers.

This striving for insight and perfection would not have been objectionable if it had not led to the so-called "stencil work," in so far as the rules which were applicable to this or that face were soon used indiscriminately for all faces.

A shortcoming that soon became apparent to all judicious operators, but not before it was too late to undo the evil.

It was so nice and easy to study certain set rules, just like a grammar at school, and then by their equal application earn the reputation of a good retoucher.

It is remarkable how difficult it often proves to make a simple truth clear to persons who believe in a certain system, when the truth fails to harmonize with their accepted system.

Even the simple truth that no two faces can be found which correspond in all particulars, or, in other words, that the difference in the facial expression in the human race is so great that no two faces could be found which would allow the substitution of the nose or an eye from one to the other without causing a marked difference in the expression, would convince these practitioners of the system.

So true and simple is the fact that the individual differences of expression in one cannot be worked up like that of another, that that which suits one face is entirely unsuitable for another, that the high light upon the forehead and nose cannot be indiscriminately placed upon another, yet the "system" adheres to its theories, and objects to acknowledging these natural.

When, at last, some of the more conservative obtained the ascendency, they merely reached the point of theoretical acknowledgment, but practically remained true to their ease and stencil system, which had already so engrafted itself upon the art of retouching that it was impossible to eliminate it. Exaggeration combined with stencil work even to-day run riot in retouche circles, and all for simple convenience.

However, the time draws nearer when the abhorrence felt by the great majority of the general public against retouching shall assert itself, and demand retouching which will be faithful and artistic, securing to every portrait the natural expression of the original type. When this day comes the stencil system will be relegated into oblivion as a species of mechanical bungling.

THE ALLOTROPIC CONDITIONS OF SILVER.

THE existence of M. Carey Lea's allotropic silver having been doubted by Professor Meldola, the former gentleman, in a communication to the *Chemical News* recently, offers the strongest evidence of the reality of the substance in question. Quite recently, also, M. Berthelot called the attention of the Paris Academy of Science to M. Carey Lea's paper on the allotropic states of silver, and exhibited specimens of the color of gold and others of a purple color sent him by the author. He explained the importance of these results, which remind us of the work of the ancient alchemists; but he reserved the question whether these substances are really isomeric states of silver or complex and condensed compounds, sharing the properties of the element which constituted the principal mass (97–98 per cent.), conformably to the facts known in the history of the various carbons, of the derivatives of red phosphorus, and especially of the varieties of iron and steel. Between these condensed compounds and the pure elements the continuous transition of the physical and chemical properties is often affected by insensible degrees, by a mixture of definite compounds.

The following letter appears in a recent number of the *Chemical News:*

Sir: In a recently published lecture Mr. Meldola seems to call in question the existence of allotropic silver. This opinion does not appear, however, to be based on any adequate study of the subject, but to be somewhat conjectural in its nature. No experimental support of any sort is given, and the only argument offered (if such it can be called) is that this altered form of silver is analogous to that of metals whose properties have been greatly changed by being *alloyed* with small quantities of other metals. Does, then, Mr Meldola suppose that a silver alloy can be formed by precipitating silver in the presence of another metal from an aqueous solution, or that one can argue from alloys, which are solutions, to molecular compounds or lakes? Moreover, he has

overlooked the fact that allotropic silver can be obtained in the absence of any metal with which silver is capable of combining, as in the case of the formation by the action of soda and dextrine. Silver cannot be alloyed with sodium.

Mr. Meldola cites Prange as having shown that allotropic silver obtained with the aid of ferrous citrate contains traces of iron, a fact which was published by me several years earlier, with an analytical determination of the amount of iron found. Mr. Prange repeated and confirmed this fact of the presence of iron (in this particular case), and my other observations generally, and was fully convinced of the existence of both soluble and insoluble allotropic silver. Mr. Meldola's quotation of Mr. Prange would not convey this impression to the reader.

Of the many forms of allotropic silver, two of the best marked are the blue and the yellow.

Blue allotropic silver is formed in many reactions with the aid of many wholly different reagents. To suppose that each of these many substances is capable of uniting in minute quantity with silver to produce in all cases an identical result, the same product with identical color and properties, would be an absurdity.

Gold-colored allotropic silver in thin films is converted by the slightest pressure to normal silver. A glass rod drawn over it with a gentle pressure leaves a gray line behind it of ordinary silver. If the film is then plunged into solution of potassium ferricyanide it becomes red or blue, while the lines traced show by their different reaction that they consist of ordinary silver. Heat, electricity, and contact with strong acids produce a similar change to ordinary gray silver.

These reactions afford the clearest proof that the silver is in an allotropic form. To account for them on suppositions like Mr. Meldola's would involve an exceedingly forced interpretation, such as no one who carefully repeated my work could possibly entertain.

M. Carey Lea.

Philadelphia, October 22d, 1891.

THE ELECTRIC AS A SUBSTITUTE FOR THE OXY-HYDROGEN LIGHT.

DURING the ten years that electric lighting has been one of the great industrial applications of electricity, and developed by the ingenuity of numerous inventors into a remarkably efficient piece of apparatus. Many uses have been found for it, and it has made its way into many situations where at first its introduction seemed to be impossible, or at any rate undesirable. In the early days of arc lighting, the great objection to the lamp was found in its uncertain regulation, resulting in hissing, flickering, and even in short periods of almost total extinction. The arc lamps in use to-day, however, give so constant and uniform a light that this objection has practically disappeared.

On account of the intense light given by the electric arc many workers have endeavored to apply it as a substitute for the oxy-hydrogen lamp used for lecture-room purposes. It will readily be seen that there are numerous difficulties in the way of a practical solution of this problem. Obstacles are found both in the regulation of the carbons and in their relative position to each other, and in keeping the supply of current to the lamp constant.

Some nine or ten years ago Mr. Douglas experimented with a light at the South Foreland Lighthouse, in which, by an ingenious arrangement of the carbons, the crater of the arc was maintained constantly in the same relative position to the centre of the lens, and furthermore the crater reflected the light forward, so that almost the entire amount of light emitted by the arc was thrown towards the lens. The results of his experiments were as follows: Taking the light given in a horizontal plane with the direct vertical arrangement of the carbons as 100, he found the light given towards

the East or front equaled	287
North or side equaled	116
South or side equaled	116
West or back equaled	38
Mean	159

Lately Dr. L. H. Laudy, of Columbia College, has adopted this arrangement of the carbons to lecture lanterns.

It is obvious in this that the ordinary position of the carbons in the arc lamp has been very much modified, as the crater, of course, generally throws the light downward instead of to one side. This peculiar position of the crater is obtained by placing the carbons in such manner that the axis of the upper or positive carbon coincides with the edge of the lower carbon furthest from the lens. The regulation of the carbons is on the principle of a focusing lamp, the arc always being in the same position in space. This is effected by a double movement of the positive carbon to a single movement of the negative, as the two are brought near to each other to compensate for the burning away of the carbon. The feed is perfectly constant, and so long as care is taken to maintain the voltage at the required figure the lamp will be perfectly free from hissing or flickering. As a consequence of this the variation in the intensity of the light is practically *nil*, and the intensity of a given lamp can be estimated within very narrow limits.

In connection with this electric lecture lantern several interesting points regarding its ready adaptability for the work are deserving of mention. Any lantern that has been used with the oxy-hydrogen light can easily be altered to carry the arc lamp. Other electric lamps for this class of work have generally required special cases of a more or less cumbersome nature. The oxy-hydrogen light requires considerable skill in manipulation, and occupies a good deal of time to set up and keep in working order. The arc lamps adjusted in a few seconds, and when once started the regulation is entirely automatic, no special skill being necessary in using it beyond the ordinary electrical knowledge requisite for the handling of an electric light of any kind. A further and very important advantage in favor of the arc lamp for lantern use is its extreme economy. It is found as the result of careful experiments that the oxy-hydrogen light costs about $1.50 per hour, whereas the arc lamp can be run at a cost for current not exceeding 20 cents per hour; indeed, this is a liberal estimate at the ordinary meter rates for current.—*Exchange.*

NITRATE OF URANIUM TONING PAPER.

BY M. MERCIER.

IT is known that some sensitive papers, variously prepared, have the property of acquiring an agreeable tone after a simple fixing, and without having been previously toned. I think I have now determined the special conditions under which the peculiarity is produced. Having the intention, later on, to treat this subject at more length, I will give simply the conclusions of my investigations,—conclusions which may be summed up as follows: When we introduce into a sensitive paper, at the same time as the chloride of silver forming its base, a suitable reducing body, capable of reducing the silver salts under the action of light and giving a certain tone, this tone is more or less communicated to the silver reduced by the action of light on the chloride of silver alone. It is thus that sizes made of arrowroot or more or less condensene starches, albumen, resins, gelatine, etc., yield papers which after a simple fixing give different tones. It is thus, again, that the oxalates, the benzoates, the citrates, etc., give with chloride of silver prints which have, after fixing, variable tones,—purples, browns, or cherry-red. It is thus possible, instead of adding to the paper the already formed reducer, to cause this last to be produced by the action of the light itself. This happens, for example, when we add to the paper a per-salt of uranium, easily reduced under the luminous action to the condition of a proto-salt.

Nitrate of uranium, which possesses besides precious preserving properties, was therefore already indicated for the preparation of a paper requiring no toning, such as the one I had prepared under the name of iso-toning paper. The print shows itself, as usual, rapidly and with great sharpness. It is fixed directly and without previous washing, either with pure hyposulphite of soda, or, preferably, in the fixing bath of hypo and sulphite of soda. The print is washed and dried; it then acquires a violet sepia tone, and in a few days gradually becomes darker and very pleasant to

the eye. The toning may be instantly obtained by burnishing with the aid of heat, or by exposing the print to heat by any means whatever. An ordinary sad-iron yields excellent results. The print then acquires a beautiful violet-black tone, very greatly resembling the best tones obtained by toning with the gold salts. I will add, moreover, that some sensitive papers acquire by this treatment a more or less dark tone, but then this tone is rarely persistent. The iso-toning paper may also be toned with the greatest facility in the weakest gold or platinum baths, nitrate of uranium modifying the action of the bath. It is possible to obtain all shades from purple up to a blue-black. Toning after fixing yields equally excellent results. Yellow negatives, such as those developed with pyrogallic acid, yield, generally, prints having a very beautiful violet-black tone, even without the intervention of eat.—*Bulletin de la Societe Francaise de Photographie.*

NEW METHOD OF PHOTO-ZINCOGRAPHY.[1]

THE method of these gentlemen, as just offered in a French contemporary, *L'Imprimerie*, is a modification of what is known as the albumen process. The facility and rapidity with which this method permits the obtaining of prints of great delicacy, shallowly engraved in intaglio, and the possibility of employing a phototype positive in the place of the usual negative (by way of screen), constitute advantages incontestably worth while making known to such persons as are interested in photographic processes applicable to printing. The greater number of existing methods require reversed negatives at once transparent and strong, conditions difficult to obtain at the same time; besides, the manipulations to which their use gives rise are delicate, and only lead to satisfactory results after long practice.

"Our method," say the Messrs. Lumiere, in M. Vidal's journal, "does not present the same difficulties. By conforming

[1] Experiments of August and Louis Lumiere, France.

exactly to the following directions there will be obtained pictures exempt from all defects, susceptible of furnishing excellent lithographic plates, or of being transformed into blocks suitable for typographic impression. The first thing is to prepare the following solution:

Water	1000 parts.
Albumen of eggs	100 parts.
Bichromate of ammonia	3 parts.
Sufficient ammonia to color solution light yellow.	

The mixture is thoroughly shaken, filtered with care, and then spread with a spatula on a sheet of polished zinc, previously cleaned with whiting. As soon as a thin coat of albumen is thus obtained, it is advisable to hasten the drying of it by slightly warming the plate. It is then exposed to the light under a positive, after which, the exposure being judged sufficient, the zinc is taken out of the frame, and with a roller is covered with a thin film of ink, *a'report*, to which has been added some medium varnish. It should appear deep gray, without any sign of an image or picture, and not black.

Upon immersing in lukewarm water the design appears very shortly, and can be very easily brought out by rubbing the surface of the zinc lightly with a little tuft or wad of cotton.

The image so obtained is a negative, and the metal is bared at the points representing the black in the original. The albumen has, in fact, remained soluble at these points, having been protected by the corresponding lines in the positive screen during exposure to the light.

The plate is then rinsed with plenty of water, dried, and plunged into a solution of perchloride of iron at 35° B., in which it should remain from ten to fifteen seconds. It is washed and then again dried. Upon subsequently passing over the zinc, heated to about 50°, a roller charged with the ink designated, and medium varnish, the ink adheres over the whole surface. A black picture is thus made, after which the deep parts are brought out by the aid of a smooth roller which is passed rapidly several times over the plate. There remains only to rub the bed with a

piece of muslin soaked in caustic ammonia. The picture appears in black, standing out from a brilliant background formed by the zinc. During this operation the bichromated albumen, insolubilized by the light, dissolves in its turn in the ammonia, and a second development is thus operated, the inverse of the first.

By the rubbing and with the aid of the ammoniacal liquid the ink is removed from the points at which the insoluble albumen is prominent, while the ink remains fixed to the zinc in the engraved parts. This last reaction is the basis of the method of the Messrs. Lumiere, and constitutes the novel side.

It is exceedingly curious to watch this inversion of the primitive image under the influence of the ammonia. The solution of the potash, soda, etc., or of their carbonates, does not bring such clear results, probably by reason of the saponification of certain elements going to make up the ink employed, and also because these substances do not possess the considerable diffusive power of the ammonia.

If the sheet is to be printed from lithographically, there only remains to prepare it in the ordinary manner by means of gallic, phosphoric, or chromic solutions. If, on the other hand, it is to be thrown into relief for typography, it should be powdered over with pulverized resin and then heated in the ordinary manner before proceeding to the first biting in.

In the latter case it is preferable to shorten the time of immersion in the perchloride of iron, in order to avoid too appreciable pitting at the points which should be in relief.—*Paper and Press.*

Positive prints in ordinary writing ink may be made, according to a writer in a French contemporary, by the following method: Albumenized paper is sensitized on a six per cent. bath of bichromate of potassium, and, when dry, a print is taken in the frame. The picture is washed, and then developed by brushing over it common writing ink, which must be done quickly. After being washed and dried, the picture is said to pass from a voilet-black to a warm tone by prolonged exposure to the light.

SPIRIT PHOTOGRAPHY.

BY H. FOURTIER.

ONE of the most curious uses of photography is, without doubt, that which is applied to the reproduction of the inhabitants of the supernatural world. The idea, that any one of sane mind would for an instant admit that immaterial things might be reproduced by a process which is essentially a material one, is inconceivable; but without dwelling on such considerations we will proceed to show some of the principal feats of spirit photography.

It is some twenty years since we had an example of it here in France, which, as might have been expected, was exposed before the public tribunals. It was at this period that in a mysterious chamber Allan Kardec, one of the enlightened, held converse with the absent, both living and dead. At the call of the medium Voltaire came to make verses, and profiting by the fact that he was no longer in subjection to the laws of this world, perpetrated some alexandrians of fifteen feet; Descarte made a display of new systems; and Bossuet lost his spelling. Not content with the offer of specimens of their writing, the spirits, under the impulse that was given them, resolved to leave their photographs to the faithful, and requested that they would employ as medium a photographer of the name of B., whose workshop was at No. 5 Boulevard Montmartre. I have under my eyes, while writing these lines, some of these astonishing proofs. The believer, for it was necessary to be very believing, after having told who was the person from the other world that he desired to see again, passed into a waiting-room, where he found some other people, come without doubt on the same errand as himself. He chats awhile with a sympathetic neighbor, and betrays to him that it is not a spiritual motive that brings him to the seance as a disciple, but a desire to behold once more the lineaments of some lost one, whom he describes in a few words, and questions eagerly whether the magnetized lens can reproduce his desire. All these details are precious to the unsuspected confederate of the photog-

rapher, by whom they are soon conveyed to the latter, to be verified later on. Immediately after the necessary information was obtained, the disciple, with elaborate secrecy, was conducted into an ordinary skylight, where the only unusual thing which could be observed was that the usual painted background was replaced by a black screen. The medium-photographer, without delay, appears with his plate-holder charged with wet collodion; the pose of the model was rapidly settled, and he was requested to concentrate his attention and his will on the apparatus which he desired to see produced. While the disciple is fixed in ecstatic expectation the photographer operates. Immediately after he brings in a plate on which one sees by the side of the believer a vague, undecided form, just strongly enough delineated to detach itself from the black background.

The proofs that we possess are generally very bad. But what astonishes us is what Scarron tells of one of these spirits which holds in its ghostly hand the ghost of a card on which is impressed the ghost of an inscription. But on account of the want of clearness, arising from the badness of the negative, we are allowed only to surmise, without having the power to read this inscription. So much the worse! It would be interesting to know what was written in the other world. If as medium Mr. B. soared above the things of this world, as photographer he was sufficiently materialistic to feel the obligation to meet the payment of his note. However, his affairs prospered. But great is human stupidity when one endeavors to reclaim mankind! Wanting in faith, the police believed it to be their duty to mix themselves in the business. A commisioner of the police, a regular old bachelor, asked, while maintaining an absolute incognito, to see the shade of the late Madame the Commissioner, who had never existed. Powerful the summons! The spirit of the false defunct appeared on the plate, corresponding exactly to the tracing made in quiet simplicity by the false disciple.

This was sufficient. The commissioner of police showed his scarf, made a perquisition, and the spiritual fluid was immediately disclosed. The black cabinet communicated with a second skylight. The sensitive plate was put for a short time in an apparatus directed upon a wooden model draped in muslin, the

head represented by a cut-out photograph. They had a whole collection prepared to satisfy the tastes of all their clients. The feebly impressed glass served to obtain the portrait of the disciple. It was truly a cunning trick. The affair terminated before the tribunal in the midst of mocking laughter from one part of Paris, while the believing, indignant at the proceedings, say if —earth to earth. Mr. B. was condemned to some years in prison for swindling, and never more did Paris hear any one speak of spirit photography.

But in America, the classical land of the medium, the new art flourished more than ever. It was the same in England. In 1889 the journal *Photography* printed an enthusiastic article on the subject of spirit-photography. Some correspondents showed themselves to be skeptical, and brought down on themselves sharp reproofs on account of their want of faith, and in No. 36 (July 18th, 1889) the journal published a spirit photograph, and a long conversation with the medium who had obtained it, Mr. Robert Johnstone. I will rapidly analyze the letter, which gives, with trifling detail, a long account of the English method. Mr. Johnstone works in the evening by the magnesium light. He then discovers the most extraordinary things. He has a friend to pose for him, directs upon him the apparatus, focuses carefully, flashes the magnesium light after having uncovered the plate, and immediately plunges it into the developer. The plate does not give the portrait of the person who posed, but in its place a spirit. This one, for example, is the late actress, Nellie Powers, who, enveloped in a winding sheet, the face alone uncovered, offers to the medium a zinnia. This zinnia is a godsend! Who can tell the mystery of the spirit zinnia? Mr. Johnstone enters into lofty conjectures on the power of the spirits who, themselves immaterial, may obstruct the production of the mortal image. (If I had a voice on the subject, I might timidly suggest that the preliminary exposure had been sufficient for Miss Nellie, but was insufficient for the living model, but as I am not one of the elect, I must keep my explanation to myself.) There are here and there reflections of peculiar value, as Mr. J. is careful to remark that he always carries his box of plates in his pocket, so that it may be mag-

netized by contact with his person. Perhaps there may be something to be deduced from that.

Another important remark deserves a literal translation. "Mr. Rita (a friend of the medium) took his place to have his portrait taken in entire darkness. After an exposure of sixty seconds, he obtained a portrait which was a perfect resemblance. What was very curious (this is my opinion also) was that a more advanced medium told me some days later that the spirit had brought to light two parts of myself,—the head and the pit of the stomach. This fact has been corroborated by my personal experience, for I have often felt the spirits take "power" over me in these same places. These facts bring forth profound speculations. The most actinic part of the solar spectrum is not entirely visible; it is not luminous. The same here is an element not luminous derived from my body, which produces on the sensitive plate an analogous effect to that of the non-actinic portion of the spectrum. This furnishes us a curious parallel between the power of the solar rays and the vital force developed in the human body. It is a simple suggestion, given to indicate a course for scientific research."

Those in with the spirits quickly climb with ease to heights which leave other poor ordinary mortals quite breathless.

And let me tell you that Mr. Johnstone declares that he regrets extremely that he has not the time to tell of many more curious things which he has observed. How very unfortunate!

The American spiritual journals are full of such accounts. The police do not care to interfere, and the spirits frolic around more and more in the gelatine-bromide. Volumes have been written on this subject, insisting on the difficulties that one must overcome in photographing the supernatural world. We call on all our French amateurs who have made double exposures on the same plate to testify that, instead of it being a very difficult thing to accomplish, it is often too easy. We would like to believe that these men err in good faith, but when one is used to living in a spiritual world how spiritual one would become,—they on the contrary. You will all join me in owning that spirit photography is one of the best photographic jokes.—*Photo. Journal, Aug., 1889.*

ADVERTISEMENTS—PHOTOGRAPHIC.

BY J. FOCUS SNAPPSCHOTTE.

NOTHING gives one, if he be a close observer or student, a better insight into the customs of a community than the perusal of the advertisements in the local paper or class publication. This is as true of the photographic guild as it is of others. In addition, these announcements often open up the humorous side of a peculiar locality or some far-off country; then again we occasionally stumble upon announcements which seem very curious to us, yet are counted perfectly legitimate where they appear. We will give a few illustrations culled from such valued German exchanges as the *Wochenblatt*, *Archiv*, and the *Deutsche Photographen Zeitung*, the latter having probably the largest advertising patronage in Germany.

* * *

MATRIMONIAL REQUEST.—A girl in the twenties, of pleasing external appearance, possessor of a newly built studio and branch establishment in a central district town of Silesia, wishes to marry herself to a photographer.

Gentlemen not under twenty-seven years, and of agreeable external appearance, with a fortune of at least 6,000 marks, Catholic faith, are solicited to send photograph with statement in accordance with the above conditions. Address H. Q. 4633.

N. B.—A native of Silesia will have the preference.

P. S.—No photographs returned.—*Wochenblatt.*

* * *

MARRIAGE PROPOSAL.—A photographer, thirty years of age, Catholic, with extraordinary practical knowledge and education, wishes quickly to wed a young woman (retoucheuse) up to twenty-six years of age, who besides education and refinement possesses a capital from 5,000 to 7,000 marks, for the purpose of establishing himself in business. Worthy offers are solicited, including portrait. Address Photograph, 30 Vienna-Neubau-Stiftgasse.—*Archiv.*

* * *

A GENUINE MARRIAGE PROPOSAL.—An independent photographer, twenty-nine years of age, a widower after several months of wedded experience, possessor of a fine paying business in a

small residence, seeks again a suitable life partner, who must possess business knowledge and qualifications as well as considerable property, which could be secured. Main conditions, irreproachable repute and presentable appearance. Address 1111.

N. B.—Approved applicants can obtain information respecting the person and business of the advertiser by applying to F. V. B., 236 Friedrich Strasse, Berlin.—*Wochenblatt.*

* * *

AN educated, elderly maiden, who is familiar with photographic work and thoroughly competent and reliable in housework, seeks a position. Clementina Meyer Haag.

* * *

WANTED—Reception lady with a good handwriting, who can master the English language and is adroit in her intercourse with the finest public. Reference and portrait to W. H. Dresden.

* * *

A FINE LADY, educated, in intercourse with fashionable public thoroughly experienced, in French and English languages, powerful both in speech and writ, seeks an appointment in a large gallery, even at a small salary.

* * *

WANTED by a lady of quality, for adequate remuneration, a few well-behaved and respectably dressed children to amuse a cat in delicate health two or three hours a day.

* * *

A CAPABLE, thoroughly independent photographer, not so very young, who in lighting, etc., fulfills the highest expectations, seeks a situation as operator or manager.

* * *

A YOUNG INDIVIDUAL, photographer, and deaf and dumb, with good recommendations, wants a situation in a studio.

* * *

FOR MY SON, who will be confirmed next Easter, a place as apprentice. Has plenty school knowledge for a photographer.

* * *

WHAT renowned photographer will take an intelligent young man, twenty-three years of age, instruct him in every branch of the art, and then engage him as a chief operator?

THE possessor of the chief photographic gallery in Brussels wishes to place his son in a similar German establishment. In return he would receive the son of his colleague into his house, to instruct him in the arts and teach him the French language. A fatherly supervision and strict oversight must be exercised by both parties, as well as giving good instruction. A. de Blochouse, Brussels.—*Wochenblatt.*

* * *

A VERY REFINED YOUNG LADY, of a high-toned family, who speaks English and French, understands polished phrases of conversation, and has some knowledge of retouching positives, seeks a situation as reception lady.—*Photo. Zeitung.*

* * *

ATTENTION.—The photographer Hesse (married, with children actually thirty-eight years old, emaciated figure, blonde, with a medium strong mustache), the same to whom I a short time ago loaned my new traveling camera, has disappeared with the same. I now entreat all gentlemen principals, him, in case the same the outfit anywhere attempts to sell, to bring to notice, that I may again come to my property. M. Scherer, Photographer, Freiburg. —*Wochenblatt.*

BUSINESS AT A PROFIT.

A SHARP commercial writer recently said this very pat thing: "The next crime short of highway robbery is to engage in a business without| making any profit." Any one of sound sense will agree that if not a crime it is foolish and disastrous.

There are many things involved in the conduct of a business which determines its success or failure. Knowledge of the business, executive ability, the employment of competent help, judicious buying, care in giving credits, fidelity in collecting accounts, skill and enterprise in pushing trade,—all these and other factors, besides the amount of capital put in, have a bearing in determining whether the business shall prove profitable or not.

The particular point I have in mind to speak of just now, and one on which profits largely depend, is the price at which goods are sold. At what per cent. above cost are goods sold? In figuring cost are all the items counted which may legitimately be

reckoned in? Having fixed a selling price which is a reasonable advance above cost, is this price strictly and impartially adhered to? These are questions which every merchant should consider vital to his success.

There should be no occasion to speak of the necessity of sticking to prices, without deviation under any circumstances; but there is. The business world knows—and the worst of it is there are customers who know—that some merchants cut prices. When they do this they not only lose the profit to which they are entitled, but they injure business,—their own as well as their neighbors'.

When a customer finds out he can buy goods under the regular price, he has the merchants at a disadvantage, and will not hesitate to improve his opportunity. Nor does it stop with him, for people delight in boasting to others when they secure a cut in prices. Thus the merchant's own business is demoralized, and his competitors, with whom he ought to live in harmony, are justly incensed.

A merchant is just as much entitled to get from customers in the money received for goods a legitimate profit as to get the cost for the goods. The merchant cheats himself who sells goods without profit. It would be a good thing for some merchants, and it would not hurt any, to write out the last sentences, and underscore them in red, and stick them us in their counting rooms where they will often meet the eye.

Experience has proved that more goods can be sold at a good price firmly maintained than can be sold under the price-cutting policy. The merchants who have achieved fortune and success are those who have made it an invariable rule to make a fair profit on every sale.

A man who charges a good price shows he has confidence in his goods; and the very fact of charging a uniform price impartially to all necessarily begets confidence in the customer that the goods are right and desirable. When a merchant runs down his own goods by letting down the price, the customer may well entertain a suspicion as to their character, and if he is after first-class goods, seeks elsewhere. Business is business.—*Michigan Tradesman.*

1492—COLUMBUS—1892.

DRY PLATE NEGATIVE BY J. F. SACHSE. IVES' PROCESS, CROSSCUP & WEST ENG. CO., PHILA.

[illegible]

COLUMBUS 1892.

OUR ILLUSTRATIONS.

THE subject of our frontispiece, "A Study in Posing," is a specimen of German photographic art from the "Atelier Eckelmann," Herzog Wall 160–195, in Bremen, Germany. The photographer is Herr Theodore Eckelmann; the subject, his talented daughter, Mlle. Tillie, a favorite German actress of American as well as European reputation. The original negative was made with a Voigtlander lens upon a rather slow Monkhoven (40 x 50 ccm.—15.7 x 19.6 inches) plate with a thick emulsion. The prints are by the publishers of the AMERICAN JOURNAL OF PHOTOGRAPHY.

—"COLUMBUS, 1492–1892." As a seasonable illustration for the opening of the present year we present to our readers a rare portrait of the discoverer of America. Winsor, in his new critical and exhaustive history of the United States, states that no likeness of Columbus is known to exist where the claim to consideration is indisputable. We have, however, descriptions of his person from two who knew him, Oviedo and his own son Fernando; then we have accounts from two persons who certainly knew his contemporaries, Germara and Benzoni; and in addition we possess the description given by Herrera, who had the best sources of information. From these we learn that his face was long, neither full nor thin, his cheek-bones rather high, his nose aquiline, his eyes light gray, his complexion fair and high-colored, his hair, which was of light color before thirty, became gray after that age. It will be seen that this description corresponds with our picture, the original engraving of which was used to illustrate Ferdinand Colon's history of his father, Admiral Christoval Colon. This work was originally written in Spanish and translated into Italian, and during the last century again retranslated into Spanish, as no copy of the original Spanish edition was known to exist. For this new edition, a copy of which is in our possession, Bart Vazque la Grabo in 1791 engraved the plate which we here reproduce. As the inscription states, the work was done from the original by quadrature to insure exactness. The original painting is at the present time in possession of the Duke of Veraguas, and has been adopted by Muñoz for his official history. The portrait of Columbus in the archives of India, at Seville, is also a copy of this painting. Consequently we may well accept this portrait as the most authentic one of which has come down to us the great navigator.

THE PHOTO-ELECTRO-ARTOGRAPH.

ONE of the most astonishing accomplishments of recent progress in telegraphy is the sending of pictures over the electric wire. This has actually been done, with results so gratifying as to give electricians the hope that this will become one of the most important branches of telegraphy in the future. The accompanying cut, reproduced from the original, will give some idea of the results attained. This cut was taken from a pictures that was transmitted a distance of twenty miles over a single wire, with 100-volt current. In the latest type of the instrument a system of alternating currents is used by which it is possible to carry on picture transmission over very long distances.

The process is the invention of N. S. Amstutz, of Cleveland, Ohio, and is known as the electro-artograph. The time occupied in transmitting an ordinary column-wide illustration need not exceed eight or ten minutes, and the stereotyping of the reproduction should not occupy more than a few additional minutes, so that the reproduction can be placed upon the presses along with the press despatches descriptive of the subject illustrated.

By a system of gears on the instruments it is possible to change the size of the picture at either end of the line; that is, a picture can be transmitted either larger, the same size, or smaller, and at the receiving end the instruments can reproduce it on the same or a different scale. The greatest accuracy is attained when large originals are used and reproduced on a smaller scale.

If it is desired to send hand sketches, a process has been devised by which an artist can make his sketches by suitable washes, preserving all of the half tones that he may deem necessary to the correct pictorial representation. Upon the completion of the sketch it is wrapped around a transmitting cylinder, and by a simple adjustment of the tracer the machine can be left to itself until the whole picture has been transmitted to its destination, where it is automatically reproduced.

RARE SALTS.

AT a recent meeting of the Chemical Section of the Franklin Institute Mr. Waldron Shapleigh exhibited the following specimens of salts of the rare earths:

Praseodymium, neodymium, and lanthanum oxides, sulphates, nitrates, chlorides, carbonates, oxalates, acetates, and double salts with the alkaline metals. Cerium oxide, oxalate, chloride, nitrate, and the double nitrate of the cerous and ceric oxides with ammonium. Yttrium and erbium nitrates, oxides, and oxalates. Zirconium oxide, nitrate, sulphate, and some double salts. Yttrium and erbium (not separated) oxides and nitrates obtained from gadolinite, cerite, monazite, fergusonite, and samarskite. Thorium and vanadium salts.

Also large specimens of the following minerals from which these salts were obtained: Samarskite, zircon crystals, and monazite sand from North Carolina, monazite sand from Brazil, gadolinite from Texas and allanite from Virginia.

Mr. Shapleigh said the collection was of interest, as it is the first time the salts of praseodymium and neodymium have been shown, and probably separated, in this country. Some of the salts have not been heretofore prepared.

The separation of these elements is long and tedious; the specimens shown have undergone nearly 400 fractional crystallizations, and have been in a state of constant preparation since early in 1888. Tons of cerite and monazite sand have been used, and tons of the salts of cerium and lanthanum obtained, but the yield of praseodymium oxide has been only a few kilos. The percentage of neodymium is much higher.

Dr. Carl Auer von Welsbach, in 1885, was the first to separate didymium into these elements, and, together with Professor Bunsen, to determine their atomic weights, that of Pr 143.6 and of Nd 140.8. The oxides are M_2O_3 and probably M_4O_7.

With one exception, the salts of praseodymium exhibited were of a pale green, and of neodymium pink or amethystine color.

Zirconium, lanthanum, and cerium should no longer be classed among rare earths, as hundreds of tons of ores from which they are obtained have been located in North Carolina, and there seems no end to the deposits of monazite sand, one of the richest ores, and containing most of the rare earths. In Brazil it does not have to be mined, as it is in the form of river sand. In North Carolina it is found in washing for gold.

Should the arts, trades, or manufactures create a demand for these so-called rare earths, nature could readily supply it from these two localities.

Thorium and yttrium minerals are not so easy to obtain; they have, however, recently been found in quantity in North Carolina and Texas.

Working on a commercial scale, he finds the yield of lanthanum from cerite nearly one per cent. higher than stated in the analyses published.

Photography of the Spectrum in Natural Colors.—H. W. Vogel gives a historical account of the photography of color and an explanation of the failures to accomplish it. It appears that Zeuker, in 1868, indicated the method of depositing layers of silver of suitable thickness to produce by interference of light colored photographs, a method which Lippman has lately developed. Lord Reyleigh's (1886) explanation of the colors in photographs produced by adjusting the layers of silver to wave-lengths in order to produce colors by interference is a repetition of the explanation of Zeuker. In the earlier processes Ag_2 Cl was used in the sensitive film, and fixing of the image produced in this film by hyposulphite of soda, destroyed by separation of fine silver particles the regular layers which were necessary to produce interference colors. Lippman uses pure bromide of silver, which under the operation of fixing leaves the film in homogeneous, regular layers suitable for producing interference colors.—*Verhandl. d. Physik. Ges. Berlin, 10, p. 33, 1891; Photogr. Mittheil., 28, p. 7.*

To avoid difficulty in mixing lampblack with another pigment or color, it should first be spread on the paint stone and carefully crushed into a loose, powdery condition, and then a sufficient quantity of the proper liquid should be added to render it semi-liquid. It will then break up and assimilate promptly with any desirable color, lead or other pigment.—*Painting and Decorating.*

REPRODUCTION IN PHOTOGRAPHS OF THE COLORS OF NATURE.

THE hall of the Franklin Institute was crowded on the evening of December 18th, 1891, to witness the reproduction of the colors of nature by the aid of the photographic sensitive plate by the process perfected and patented by our well-known townsman, Mr. Fred. E. Ives. To this scientific treat was added a most interesting lecture by Mr. Wm. N. Jennings, who accompanied Mr. Ives on his trip to the National Park. The subject of the lecture was the beauties and wonders of the Yellowstone region.

Mr. Ives, upon being introduced by Professor Houston, said the greater portion of the illustrations to be shown were "snap-shots" made by Mr. Jennings, and the pictures, he said, would do credit to the best photography. This assertion was strongly borne out by the enthusiasm of the appreciative audience. Mr. Ives also explained that he had remedied certain defects in his color camera, and he had been so successful in obtaining open landscapes and other views as to convince former skeptics of the possibility of making photographs in the colors of nature. The limelight used, he said, was not powerful enough to bring out the sunlight illumination, but the effect produced was intermediate between moonlight and sunlight. The occasion, he said, was the first in the world in which an attempt was made to illustrate a lecture with photographic pictures in the natural colors, and before the close of the season he meant to demonstrate the success attained with a greater variety of subjects. The colored pictures, as they were thrown upon the screen, occasioned much surprise, and were all applauded by the large audience present.

Mr. Jennings, who told the story of the trip of over 4,000 miles, was frequently interrupted by applause during the delivery of his lecture. Many of the views were very beautiful from both artistic and photographic points of view; and at the close of the exhibition the universal verdict was that the photographic reproduction of the colors of nature was an unsolved problem no longer.

Send in your last year's volume and have it bound. It will give you a volume of reference worth double the amount paid.

Photographic Hints and Formulæ.

An Ink for Obtaining White Writing on Photographs.—

Iodide of potassium	20 grams.
Distilled water	60 grams.
Sublimed iodine	2 grams.
Gum arabic	2 grams.

In printing, a little of the edge of the paper is allowed to extend, and on this portion which has become very black the solution is used for the writing, which is then allowed to dry.—*Photographic Magazine.*

Imitation Ground Glass for Studios or Other Uses.—Sugar of lead, ground fine, and bleached linseed oil with a little varnish, well mixed and put on with a stiff brush.

Aniline-Black Marking Inks.—From time to time there appear in journals and works of reference certain formulæ for preparing indelible ink which have "aniline-black" as a base. Some of these bear evidence that they were written without any experience or knowledge of the subject, by persons unfamiliar with the nature and chemistry of true aniline-black. Such are, for instance, all formulæ which direct ready-formed aniline-black to be "dissolved" or "mixed" with other ingredients. Other formulæ, again, fail or are unsatisfactory for other reasons. Mr. R. Wright has recently investigated the subject, and has obtained some practical results, which he has communicated to the *Chemist and Druggist.* We give the essential parts of his paper here. In order to produce a satisfactory result, the aniline-black must be generated upon the fibre or fabric itself. It is therefore necessary that a mordaunt be first applied to the latter, and afterwards the proper aniline solution which will produce eventually the black color. The author recommends either of the following mixtures as *mordaunts:*

(*a*)	Potassium chlorate	20 grains.
	Copper sulphate	40 grains.
	Ammonium chloride	20 grains.
	Distilled water	6 fl. dr.
	Thick mucilage of acacia	2 fl. dr.

Dissolve the solids in the water with heat, then add the mucilage.

(*b*)	Potassium chlorate	20 grains.
	Copper chloride	40 grains.
	Ammonium chloride	20 grains.
	Sodium chloride	30 grains.
	Distilled water	5 fl. dr.
	Thick mucilage of acacia	3 fl. dr.

Prepare like preceding. And the following as *developers:*

(*c*) Aniline	1	fl. dr.
Toluidine (solid)	10	grains.
Dilute hydrochloric acid	2	fl. dr.
Mucilage of acacia	2	fl. dr.

Dissolve the toluidine in the aniline, add the acid and mucilage, and mix. (The author says he used solid "ortho-toluidine." This must be an error, since this is a liquid, and remains so at temperatures over —20°.C. He evidently means para-toluidine, which forms the starting point for fuchsin.—Ed. *American Druggist.*)

(*d*) Same as *c*, with addition of methylated spirit (or alcohol)	1	fl. dr.

The spot upon which the writing is to be made is first to be treated with one of the mordaunts, and dried. It is then to be written upon with one of the aniline solutions by means of a quill pen. The fabric is then laid aside for several days, the longer the better, so that the air may exert its utmost influence upon it. Finally the fabric is boiled with soap lye, when the writing will come out perfectly black.—*American Druggist.*

Development with Sucrate of Lime.—I have experimented with carbonate of lithia as an accelerator, and I have obtained with it rather favorable results. However, in opposition to Mr. Wickers, I have always found that carbonate of lithia, used even in larger doses than those recommended by this author, was not sufficiently active, and that development had to be too much prolonged in order to obtain prints of good intensity. I have also observed that the prints developed by this process were as often fogged as when I made use of carbonate of potash. The oxides of alkaline metals or their alkaline salts are not the only accelerators susceptible of being used in pyro development. Two oxides of the earthy alkaline metals, lime and hydrate of barytes, may also be used as accelerators. I will not insist upon the second, which, although giving some results, should be rejected from photographic practice on account of its caustic properties, and of its too great affinity for the carbonic acids in the air, which prevents the keeping of its solutions. This objection does not obtain for the first, provided, however, that ordinary lime water is not used, but a solution of succharate or sucrate of lime. In my experiments I have made use of the following solutions:

SOLUTION A.

Pyrogallic acid	10 grams.
Sulphite of soda	20 grams.
Citric acid	2 grams.
Water	120 grams.

SOLUTION B.

Water	1000 grams.
Sugar	sufficient quantity to triturate.

To which add a sufficient quantity of pure lime to saturate the sugar solution. In this manner we get a highly concentrated liquid, very alkaline, and which keeps for a considerable time. To develop, I mix:

Water	80 cubic cent.
Solution A	2 cubic cent.

I throw this over the plate, and allow it to remain for a few moments, agitating; then I add to this bath, gradually and according to the results obtained, from one to two cubic centimeters of the solution B. These solutions should be made with a great deal of care and prudence, as the sucrate of lime is an accelerator of very great energy. Moreover, according as the plate has been more or less exposed, we may add to the developing bath a few drops of a solution of citric acid, or of a solution of an alkaline bromide. We obtain in this way very soft prints, sometimes too soft, which, however, are not more free from fogging than plates developed with hydroquinone (new bath), or pyro having for accelerators ammonia, potash, soda, carbonate of potash, of soda or of lithia. I do not give this process with sucrate of lime as perfect, but I give it as perfectable and susceptible of application. If I have undertaken to write these few lines it is because it has never been brought to my knowledge that up to the present time the oxides and the alkaline salts of the earthy alkaline metals have been studied from a photographic point of view.—*Leon Degoix, in Photo. Gazette.*

A Rifle Camera.—An ingenious invention in the line of photography is announced from Vienna. It consists of a miniature apparatus of aluminium, which is attached to the barrel of a gun. When a shot is fired an instantaneous exposure is made, and a circular photograph is obtained which shows the object aimed at. The target or game might be photographed in this manner.

The Editorial Dropshutter.

The fourth lecture under the auspices of the New York Camera Club was given on the evening of December 21st before a large and appreciative audience. The subject was "The Fair City of Florence," by the Rev. Charles R. Treat.

F. G. Warner, of San Francisco, who lately returned from an exploring expedition to the mountains of Alaska, reports that the party obtained over three hundred good negatives, all of which are sure to prove of great scientific and general interest.

The Liverpool Photographic Society has prepared a series of lantern slides, entitled "Illustrated Liverpool," which will be sent to this country in return for the set "Illustrated Boston," which proved so acceptable to our British cousins.

William Notman, the celebrated photographer of Montreal, Canada, died November 25th.

The *Photographic News*, commenting upon the new ferrotype dry plates, the invention of Nievsky, as mentioned in our last number, states: "By shutting up a plate in a printing frame behind a transparent positive,—say a lantern slide,—and giving a momentary exposure to daylight, or say about six seconds to lamplight, a positive copy can be obtained, which can be developed, fixed, and dried in something less than two minutes. We can imagine many an instance in which this wonderfully quick copying might be of value, and at a pinch a new negative might be made from such a picture if the original one happened to get broken. This new process has much to recommend it, and is well worthy of the attention of those who are interested in photographic novelties."

No time like the present for renewing your subscription. Read our offer on third page of cover.

An English contemporary offers back numbers of American magazines as a premium offer, and then goes on to state: "You may despise it, but an American magazine has an educational interest that is greater than its mere money value.

A happy and prosperous New Year to all! Remember, your subscriptions for 1892 are now payable; thereon depends much of our happiness and prosperity.

Keep your lenses in a dry place of an even temperature, away from all dampness and sudden changes of temperature; this is especially necessary in the winter. The polish of many a fine lens has been ruined by the failure to take heed of this simple precaution.

We furnish index and title page for Volume XII. with this number. In case you do not receive it please let us know by postal, and it will be sent by return mail.

Why cannot Dr. Andressen give us eikonogen in a permanent form, which will be as vigorous as the first crystals of that reducer, or which will work as uniform as pyro? There seems to be but little uniformity in the working properties of the different lots sent out. In our experience no two cans of the white powder have been exactly alike.

Our contemporary, *Lux*, of Amsterdam, the official organ of the amateur societies of Amsterdam and Harlem, comes to us in gala dress for the present month. It is the first number of the third volume, and contains a number of extra illustrations. Our old friend Sardanoplus has an amusing fling at the guild of amateurs, in which he classifies them into seven classes, prominent among which are the "know-all-but-do-nothings," a class which is fully represented in our own section of the country. We wish our Dutch contemporary prosperity and well-deserved success.

Send your copies of the AMERICAN JOURNAL OF PHOTOGRAPHY to this office, and have them neatly bound in half crimson morocco, or any other color you desire, marbled sides and best workmanship. It only costs you $1.00, postage or expressage to be paid both ways by the subscriber.

Now is the time to renew your subscription.

Among the means taken by the Mandarins of the Mangtse district to excite the populace against the Christian missionaries a number of placards were posted in chief towns along the Yangste-Kiang. The most ingenious lies were embodied in some of these posters. It is stated that the one which had the greatest effect of stirring up the ignorant populace set forth that the missionaries kidnaped women for the purpose of cutting off their breasts to manufacture into ingredients for photographic chemicals.

Miss Catherine Weed Barnes is now the editor of the Photographic Department in *Frank Leslie's Weekly*. She will have an article on some practical subject once every month, and invites correspondence.

Photographic Scissors and Paste.

Curiosities About Gold.—Gold is so very tenacious that a piece of it drawn into wire about one-twentieth of an inch in diameter will sustain a weight of five hundred pounds without breaking. Its malleability is so great that a single grain may be divided into 2,000,000 parts, and a cubic inch into 9,523,805,525 parts, each of which may be distinctly seen by the naked eye. A grain and a half of gold may be beaten into leaves one inch square, which if intersected by parallel lines drawn at right angles to each other, and distance only the one-hundredth part of an inch, will produce 25,000,000 little squares, each of which may be distinctly seen without the aid of a glass. The surface of any given quantity of gold, according to the best authorities, may be extended by the hammer 310,814 times. The thickness of the metal thus extended appears to be no more than the 566,020th part of an inch. Eight ounces of this wonderful metal would gild a silver wire of sufficient length to extend entirely around the globe.—*Detroit Free Press.*

Photographs of the Moon.—Professor Weinek, director of Kepler's old observatory at Prague, has been engaged for some years in making photographs of the moon, with the idea of securing a perfect map of the moon's surface. While engaged in this work he received a negative from the Lick Observatory. He saw that his own laborious work with an inferior instrument could never vie with the results obtained at Fort Hamilton, and he offered his services gratuitously to the Lick astronomers, saying that the matchless moon negatives he had received would save him years of effort in his task of completing a lunar map. Professor Holden thinks that about sixty moon pictures will be required, and that the expense of drawings and heliogravure plates will be about $5,000.—*San Francisco Chronicle.*

A beautiful monument has been erected to the memory of Allessandro Manzoni, the Italian poet, in Lecco. Lecco was chosen as the site of the statue, as it is the scene of his celebrated novel, "I Promessi Sposi" ("The Betrothed"), as well as his home.

Art in Turkeytown.—Photographer—"Is there any particular way in which you would like to be taken?"

Mr. John Johnsing—"Yes, sah. If dere's no dejection, I'd like to be taken a light cream color."

The Secretary of the Treasury has made a ruling to the effect that books, photographs, and similar goods cannot be imported through the mails, but must be sent through the custom house and pay duties there. The effect of this ruling is to entail great inconvenience, delay, and loss of both time and money upon a large number of business houses and citizens, to whom such importations are a necessity, and who find themselves seriously interrupted and hampered by the new restrictions. Petitions to the secretary, reciting the evils resulting from his ruling, and requesting its reversal, are in circulation among the parties interested. They should be numerously signed, and promptly forwarded to Frank Hegger, 152 Broadway, New York.

Snow on the Moon.—Remarkable discoveries have been made at the Lick Observatory, California. Professor Holden, the director, has secured through the big telescope better photographs of the moon than have been taken anywhere else, and the work of photographing goes on every hour when the satellite is visible. By studying these photographs with a magnifying glass, and comparing them, any changes taking place on the surface of the moon may be discovered. The astronomers on Mount Hamilton have discovered some things that nobody else ever saw; but they have not determined whether these are new features or things that are too small to have been seen through a less powerful telescope. For example, upon the top of one of the mountains of the moon the photograph shows a luminous white spot that looks like snow. If that is snow, and if it was not there before, the presence of an atmosphere is indicated. It has been believed that the moon has no atmosphere, and therefore is uninhabitable; but if it should be demonstrated that snow falls upon the surface of the satellite, the accepted theory would be upset, and astronomers would begin to study the moon with new and greater interest.

Objects upon the moon are detected by their shadows, and a projection or eminence fifty feet high casts a shadow large enough to be seen through the Lick telescope. If Professor Holden, studying his series of photographs, should discover, some day, a new shadow where none had been cast before when the moon was in the same position and under the same light, he would know that something had been erected upon the surface, either a part of the crust upheaved by some internal movement or a building put up by living creatures. The moon appears to be a dead, desolate waste of played-out volcanoes and cooled-off lava beds, without atmosphere, and, like Arizona, rather short of water and good society.

THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.

A STATED meeting was held Wednesday evening, December 9th, 1891, the president, Mr. John C. Bullock, in the chair.

The board of directors made their monthly report, stating that the work on the improvements in the new quarters was progressing favorably. With a view to supplementing the subscriptions made by members, they recommended the appointment of a special committee of the society, to act in conjunction with the committees on meetings and lantern slides, in arranging for a series of three or more public entertainments to be given during the present season for the benefit of the house fund.

They further recommended that a special committee be appointed to arrange for a suitable reception on the occasion of the completion of the work in the new quarters of the society.

At the conversational meeting, November 25th, a collection of interchange slides from the Lantern Society of London, England, were shown. They were a remarkably fine set, and certainly one of the best collections ever sent to the society in this manner.

The amendment to the by-laws offered at the last stated meeting, making the annual dues of active members ten dollars, was taken up for action, and after considerable discussion was passed by a large majority.

Mr. Cheyney called the attention of members to an interesting book which he had come across, published in Philadelphia in 1853. It was entitled "Plain Directions for Obtaining Photographic Pictures by the Calotype and Energiatype, etc.; Also Practical Hints on the Daguerreotype," by J. H. Croucher.

He read various extracts from the book, which were interesting as contrasting some of the old-time photographic processes with those of the present day. Peculiar interest, however, was attached to one of the extracts on "daguerreotype panoramique," an account of recent threats said to have been made by Mons. Moissard to prosecute certain Americans for an alleged violation of his patents.

The extract read as follows:

DAGUERREOTYPE PANORAMIQUE.

"This apparatus is constructed to admit of a view of considerable length and of extreme nicety of delineation, being taken with a lens of moderate diameter. The lens is made to have a horizontal movement, which brings it to bear successively upon every part of the horizon within 150 degrees. Having been fixed so that the vertical

lines of the object are perpendicular with a line drawn through the ground-glass on which the focus is taken, the prepared plate is placed in a *flexible frame* and retained in a certain curve by stops fixed to the frame. The lens is now turned to the extreme limit of the view to be taken, and then gradually and smoothly moved onward by a rack-work attached to the camera till it reaches the other extremity, waiting a longer or shorter time at each point as the object is more or less illuminated. The plates are prepared and fixed in the ordinary way. The use of this instrument is difficult, however, and requires considerable practice to produce good pictures."

A large collection of hand-cameras was shown before the society, and their various peculiarities explained and discussed. Among them were the following: Anthony's Magazine Camera, the Sunol, the Kameret, the Hawkeye, the Premier, a folding Kodak, converted to use cut films in double holders, a Scovill Detective, a Henry Clay with long focus extension base-board, a Henry Clay Stereoscope, a Beck Stereoscope, a Swinden & Earp Magazine, a magazine camera by the Stereoscope Company, of London, England, also one made by Turnbull, of Edinburgh.

Mr. Carbutt stated that in view of the increase in stereoscopic work it might be well to mention that a very simple way of making transparencies for the stereoscope consisted in the use of cut films with a mat back. To obtain a perfect stereoscopic effect the negative has to be bisected and the views changed around. If the negative was taken on a film it could readily be cut with a square and knife so that they would come together perfectly. Where glass plates were used they had to be cut with a diamond, thereby running the risk of a rough edge. At the next meeting he intended to show some very good results in transparencies of the kind referred to.

Dr. Mitchell asked whether any of the members had tried the new developer, "para-amido-phenol." He expected to show a few lantern slides at the next meeting made by this developer, which was claimed to be the coming developer. So far it was extremely expensive, the wholesale price being about thirty-five cents per drachm; but it was very powerful, and worked quickly and strongly in a very dilute solution, about one part to two thousand. It was particularly excellent for bromide paper, giving much better whites than could be obtained with oxalate.

Mr. Stirling exhibited the Prosch lamp for pure magnesium powder, which seemed to be one of the best of its kind. He also exhibited a print made by the Kallitype process.

Adjourned.

In the Twilight Hour.

ALL men can't be masters.

A DANGER foreseen is half avoided.

A GOOD friend is your nearest relation.

THERE is more fatigue in laziness than in labor.

HONEST men's words are as good as their bonds.

WHERE the sunshine does not enter the doctor must.

THE greatest misfortune of all is not to be able to bear misfortune.

HUNGER scarce kills any, but gluttony and drunkenness multitudes.

REFLECT well before speaking, that a word once uttered can never be recalled.

NO MAN can be provident of his time who is not prudent in the choice of his company.

HAPPINESS generally depends more on the opinion we have of things than on the things themselves.

HE that follows his recreation instead of his business shall in a little time have no business to follow.

ADVICE, like snow, the softer it falls the longer it dwells upon and the deeper it sinks into the heart.

CHEERFULNESS is not a proof that the mind is at ease, for often "in the midst of laughter the heart is sad."

The envious man is like that rich man mentioned by Quintilian who poisoned the flowers in his garden, so that his neighbor's bees should get no more honey from them.

THE plainer the dress, with greater lustre does beauty appear. Virtue is the greatest ornament, and good sense the best equipage.

WE easily believe what we wish, but we have a wonderful facility in raising doubts against those duties which thwart our inclinations.

TO THOSE who do good in the morning every hour of the day brings pleasure, and for them peace and joy spring from every object around.

THERE is scarce any lot so low but there is something in it to satisfy the man whom it has befallen, Providence having so ordered things that in every man's cup, how better soever, there are some cordial drops, which if wisely extracted are sufficient to make him contented.

THERE are four good habits,—punctuality, accuracy, steadiness, and despatch. Without the first of these, time is wasted; without the second, mistake the most hurtful to our own credit and interest and that of others may be committed; without the third, nothing can be well done; and without the fourth, opportunities of great advantage are lost which it is impossible to recall.

THE first weed pulled up in the garden, the first seed put in the ground, the first dollar put in the savings bank, and the first mile traveled on a journey are all very important things; they make a beginning, and thereby a hope, a pledge, an assurance that you are in earnest with what you have undertaken. How many a poor, idle, erring, hesitating outcast is now creeping and crawling his way through the world who might have held up his head and prospered if, instead of putting off his resolutions of amendment and industry, he had only made a beginning!

Literary and Business Notes.

AUTOTYPIE IN ALL ITS VARIOUS BRANCHES. By J. O. Mörch. Published by E. Liesegang, Düsseldorf, Germany. This compact manual, with eight explanatory illustrations, is what it claims to be,—viz., a practical guide to the production of printing plates from photographic positives and originals of unbroken graduation by photo-mechanical means, for use on book, lithographic, or copperplate press. This concise work by Prof. Mörch is written in a clear and plain style, and will prove a boon to the practical worker in the various half-tone processes. The writer, being a practical etcher, here gives the results of his own experience. We think this is the first exhaustive practical work in this important development of the photographic art.

THE AMERICAN ANNUAL OF PHOTOGRAPHY AND PHOTOGRAPHIC TIMES ALMANAC FOR 1892. New York: The Scovill & Adams Company. The first of the annuals to reach us. The work is handsomely bound in cloth, and contains 363 pages of reading matter, with 24 full-page illustrations. The meat within the shell consists of 120 papers upon every branch of photography by as many different writers, native and foreign, many of whom are well-known authorities. In addition to the above, the annual contains the usual amount of calendars, formulæ, tables, etc., the whole forming a handy reference volume which every intelligent photographer should have within reach. Orders for same sent to the office of AMERICAN JOURNAL OF PHOTOGRAPHY will receive prompt attention.

HANDBUCH DER PHOTOGRAPHIE: For Amateur and Tourist. By Major L. Pizzighellé. Second edition. Wilhelm Knapp, Halle a. S. Volume I., Photographic Apparatus; embellished with 531 engravings printed in the text. The first edition of Major Pizzighellé's work, published in 1886, has been exhausted for a considerable time, and to meet the demand the present enlarged edition now makes its appearance. So great have been the strides in the photographic art within the past few years that the present edition of Major Pizzighellé's work will, from necessity, have to be divided into three volumes. Volume I. deals exclusively with photographic apparatus under seven sub-titles,—viz., I. The Pinhole Camera, II. The Objective, III. The Camera, IV. The Selection of a Camera and Lens, V. Stereoscopic Apparatus, VI. Apparatus for Enlarging and Reducing, VII. The Magnesium Blitz-Pulver Apparatus. The presswork, like all work from the establishment of Wilhelm Knapp, Halle, is a model of neatness and a credit to the publisher.

THE *New England Magazine*, an illustrated monthly published by the New England Magazine Corporation, 86 Federal Street, Boston. $3.00 per year. The Christmas number of this interesting publication has been received, and is full of entertaining matter, not the least of which are the "Stories of Salem Witchcraft" (illustrated), by Winfield S. Nevins, and "Pen Pictures of the Bosphorus," by Alfred Hamlin. The typographical work is excellent, and the printing of the many half-tone blocks in the text shows the great care taken and perfection arrived at by the publishers of this periodical. We congratulate the corporation upon its well-deserved success.

DIE NEGATIV RETOUCHE: According to the Laws of Art and Nature. By Hans Arnold. A. Hartleben's Verlag, Leipzig and Vienna. The most exhaustive and voluminous work upon retouching ever published. It consists of 480 pages, and is embellished with 53 explanatory illustrations. Every department of the retoucher's art is dealt upon in a masterly manner. The work should be in the hands of every retoucher who is conversant with the German tongue.

INSTANTANEOUS MIDNIGHT PHOTOGRAPHY,
BURNING OF THE LURAY INN.

NEGATIVE BY S. K. WRIGHT, LURAY, VA.

HALF-TONE REPRODUCTION WITH COLOR BLOCK.

AMERIC[illegible]

PHOTO[illegible]

[illegible]

At the meeting [illegible]

AMERICAN JOURNAL

OF

PHOTOGRAPHY

THOS. H. McCOLLIN, Managing Editor.

JULIUS F. SACHSE, Editor. XANTHUS SMITH, Associate Editor.

VOL. XIII. FEBRUARY, 1892. No. 146.

THE PHOTO-TELE-OBJECTIVE.

AMONG the great improvements in photographic optics which within the last year were brought to the notice of the scientific world, none has attracted more general attention than the announcement just made public, that two scientists, one in England, the other in Germany, who, presumably entirely unknown to each other, had solved the problem of telescopic photography, with an ordinary portable camera without the use of a telescope. The possibility of this new lens combination is so great that we must refrain from even discounting the important results which are in store for the scientific photographer of the present day.

From England we learn that Mr. T. R. Dallmeyer has constructed a photographic objective which in an ordinary camera, with an extension of two feet from the anterior level to the focusing screen, made it possible to secure an instantaneous photograph of a crow in mid-air about to settle on the top of a tree over one hundred yards distant; the image measuring three-quarters of an inch from tip to tip. A direct photograph of the sun was also secured by the same means; the disc measuring three-quarters of an inch in diameter.

Wonderful as this sounds it sinks almost into significance if we may trust the advices received from Germany regarding the results obtained by Dr. A. Miethe, the learned editor of the *Photographische Wochenblatt* with a lens of his own invention.

At the meeting of *Berlin's Practical Photographers*, November

4, 1891, it was stated that a picture of a monument on the Rhine had been obtained with the new objective from the opposite shore, two thousand meters distant; the image measuring 10 cm. [3.9 in.] the focus of the lens being about forty inches, whereas, with the objectives in general use, it would require a lens of about eight m. or twenty-six feet focus, to obtain equal results. Dr. Miethe, in describing his invention before the meeting, stated:

It is well known to every photographer that the size of the image upon the ground-glass depends upon one of three conditions, viz.:

1. The focal length of the objective.
2. Upon the distance of the same from the object to be photographed.
3. Upon the size of the original.

Two of these conditions, under certain circumstances, are subject to variation, viz: The distance from the object and the focus of the lens. If the object to be photographed can be approached, or lenses of different focal power are at our disposal, then we can obtain our image of any desired size.

Unfortunately, such favorable conditions do not always exist in everyday practice.

A nearer approach to the desired object is often impossible or impracticable, being unapproachable; for instance: Inscriptions or architectural details; game in its wild state; flying birds; ships at sea, and public ceremonies, are all subjects which fall outside the scope of photography, because the required distance is too great to afford recognizable detail in the resultant negative. In such cases the usual resort is the use of lenses of extreme long focus, which is very circumscribed.

Granted we had to photograph an inscription upon a rock formation 100 yards high, to obtain a fair view, without distortion, we would have to be at least 250 yards from the rock. This would bring the inscription at least 280 yards in a direct line from the lens. To insure distinctness the letters must appear at least 4 m.m. high upon the resulting picture. To attain this result a lense of 5.6 meters focus would be requisite, or, in other words, it would take a camera with an extension of about 18 feet.

To carry a camera of this kind on a photographic tour is not to be thought of.

Yet this is not a chimerical case, as similar ones crop out in actual practice almost daily with architectural photographers, explorers and travelling scientists.

Small images, with subsequent enlargement, as is universally known, suffer from the disadvantage that the grain of the plate even by a slight enlargement is apt to become so objectionably prominent as to destroy all detail.

To overcome the great difficulty in exposures, Dr. Miethe, the same as many photographers (professional and amateur) tried to surmount the difficulty by the use of a telescope; with a result more than questionable.

Independent of the circumstantiability of the contrivance, he could not obtain anything approximating to a serviceable negative. Then, again, a camera with a telescope in place of a regular photographic objective proved so awkward and unstable that success was not to be looked for, even with the firmest tripod, as the lightest breath of air or the least tremor spoiled the image.

Now, however, by the application of an entirely new principle in optics, Dr. Miethe has succeeded in overcoming the main difficulties, simply by the use of a combination of a convex lens of short focus with a concave lens of long focus; which are connected so as to allow an adjustment of the distance one from another.

This system, it is claimed, has the following advantages:

1. It produces an enlarged, reversed image of a distant object.

2. It can be used for any length of camera; therefore will give any size image.

3. By an adjustable combination it produces enlarged images in proportion to the focus of the combined lenses.

To illustrate the theory by an example: Granted we have a convex lens of 16 m. focus with concave lens of 1 m. focus combined in a reciprocal distance of 15 m. placed before our inscription, distant 280 m., this system with a camera extension of 13 inches will show an image as large as the ordinary lens with an 18-foot camera extension.

Naturally, by a slight variation of the lens-combination, we can obtain, at will, larger or smaller images, with any length camera.

This, in itself, is a great scientific advance. As a further illustration, Dr. Miethe produced two cameras, one with an Aplanat, the other with his new Objective. Both cameras extended the same length. By focusing sharp upon the same gas-flame, it was observed how gigantic the image of the new lens was in proportion to the old system.

Dr. Miethe then offered a number of prints made with the new Objective. They represented the towers of Potsdam, taken at a distance of 2480 meters, with a camera extension of 28 cm. (10.9 inches), in an ordinary portable camera. It was noticed that a great amount of detail shown in the picture was undistinguishable with the naked eye at that great distance.

Naturally the results here shown were more or less crude, and are not to be taken as perfect. The construction of the new objective was made upon very crude calculations, and even the technical part was not quite successful.

Dr. Miethe hopes to be able, during the present winter, to so far complete the necessary computations that he can submit objectives of far greater scope and power, and that all will agree that the invention is one of great technical importance to photography.

J. F. SACHSE.

Illustrated Reporting.—In connection with the suicide of General Boulanger, a feat has been accomplished by the Paris weekly papers which shows to what perfection of dispatch illustrated reporting has now been brought. On Wednesday, on the reception of the news of the general's death, the *Illustration* sent to Brussels two members of its staff, one a draughtsman, the other a photographer. On Thursday morning these artists had photographed the general lying in state, as well as the hotel in the Rue Montover, and had even improvised a representation of the scene in the cemetery. They then took train and arrived in Paris on the same day with all that was needed for the illustration of that day's issue of the journal. An interesting detail is that the proofs of the photographs were taken and the artist's drawing executed during the railway journey back to Paris.—*London News.*

NEGATIVES FOR ENLARGING.

BY ELLERSLIE WALLACE.

HAS the prophecy ever been fulfilled that a time would come when it would be easy to make miniature negatives in pocket-cameras, and enlarge prints from them to any desired size?—the results, of course, to be first class in quality, and as good as, or better than if a large apparatus had been employed.

We think not. That excellent enlargements are made in great number, and much more readily too than in former times, must be admitted. But when the above question is asked, and inquiry made of those who have set out with high expectations in making negatives whether they have always been gratified with their prints when enlarged, have they not missed certain details in the enlarged print? Has there not been flatness and loss of brilliancy? Have not defects in the negative, so small as apparently to amount to nothing, come out in the print large in size and sadly prominent?

It will not do to press this rather searching photographic self-examination too far.

The modern processes by which enlarged positives either on glass or on paper are produced really leave nothing to desire *except good negatives.* This is the point. Good negatives. Good not merely as negatives, but moreover, good in possessing those particular features that render them capable of giving good enlarged prints. What are these features?

First, sharp optical definition. There can be no excuse nowadays for not securing this desirable quality with our excellent lenses. If a given stop on a given subject will not enable the lens to cut sharply to the edges of the field, a smaller one can be inserted without fear of making the exposure unduly long. But do photographers of the present day always understand just how to focus their lenses to the best advantage? If they are making portraits, for instance, where the head must be large, and consequently close to the lens, can they always be sure of choosing that point for

focusing upon which will distribute the definition evenly over the whole face and head when the stop is put in? Of course, it is impossible for any one to give a rule for matters like focusing a lens; but one may say that he has often obtained a good general focus on such difficult subjects by rapidly moving the ground-glass back and forth for an inch or two and observing at what particular point the image appeared fairly sharp all over. After selecting a proper stop, we would sharpen up the image with the fine screw, making up our minds at the same time what portions of it would have to be sacrificed as regarded extreme definition.

The focusing of landscape subjects is a very easy matter. If animals are being taken, however, sharp results can only be expected when a "finder" the duplicate of the lens used for making the picture is employed. If work of this kind is attempted, every care must be taken that the focusing screw moves with ease and evenness. Any jerking in the rack-and-pinion will render the operation of focusing difficult and uncertain.

Snap-shot exposures can undoubtedly be made to yield sharp negatives, but it will require more than ordinary care to keep the camera steady and free from movement at the moment of releasing the shutter. If the work be done with any idea of enlarging it afterwards, it would be advisable to have a fixed rest for the camera in default of the regular tripod. With the tripod there never need be any doubt of getting good, sharp negatives.

The next requisite for good negatives for enlargement is a proper tone-scale. By this we mean that flat, thin, solarized plates cannot be coaxed into fitness for enlargement; nor on the other hand can those which are crude and lacking in half-tone from undertiming or underdevelopment. Reducers and intensifiers are particularly useless here. The negative should be properly timed; and developed perhaps a trifle short of the density required for contact silver printing. Correct exposure of the plate is the *sine qua non.*

With the great rivalry now existing between different developers, it is a matter of some difficulty to give advice regarding the choice of a suitable one. There is no doubt that the standard pyro developers will now and then leave enough yellow stain on

certain kinds of plates to interfere greatly with enlarging. Ferrous oxalate is free from this objection, but is more troublesome to work; at least, it is generally so considered. The amateur should not let such a matter as this stop him however; the writer has recently seen a large number of negatives made with ferrous oxalate which exceeded in quality anything of like size which he could remember.

Lately it has become a well-established fact that a mixture of the two substances, hydroquinone and eikonogen, develops better than either of them used separately. These mixtures are sold in the stock trade under various names, and it will save trouble to procure a sample and work it according to the directions given. For those, however, who prefer to compound it for themselves, we suggest the formula of Mr. J. F. Sachse, as originally published in the AMERICAN JOURNAL OF PHOTOGRAPHY (VOL. XI., p. 265), viz.:

Sulphite of soda,	5 drachms
Eikonogen,	45 grains
Hydroquinone,	15 grains
Water, distilled,	8 oz.

Heat water to boiling point, and add the sulphite of soda; when dissolved add eikonogen, then the hydroquinone. Shake until thoroughly dissolved. After this solution has become cold add

Carbonate of potash,	1½ drachm

For use take equal parts of developer and distilled water.

The Floral Law of Color.—A florist who declares that a blue rose is among the possibilities has had called to his attention by a fellow-florist a very interesting law which appears to govern the coloring of all flowers. The law is simply this: "The three colors, red, blue, and yellow, never all appear in the same species of flowers; any two may exist, but never the third. Thus we have the red and yellow roses, but no blue; red and blue verbenas, but no yellow; yellow and blue in the various members of the viola family (as pansies, for instance), but no red; yellow and red gladioli, but no blue, and so on."—*Waterbury (Conn.) American.*

COPYING AS AN AMUSEMENT.

BY XANTHUS SMITH.

IN how many ways may the true lover of photography make the art agreeably entertaining and instructive. If his attention, and indeed one must also say her attention (for a large percentage of the best amateur photographers are ladies), be turned in a good direction, see the diversion that is given from the time that they begin to select their outfit, and gather together the necessary materials for the work, to the completion of the finished prints.

At this season, when the amateur is almost entirely debarred from outside work, a very interesting and instructive branch is opened by making copies of valuable works of art and objects of vertu.

To be convinced of the importance and value of copying by photography, one has only to think of the inestimable benefit which has been bestowed by it upon artists and connoisseurs in furnishing them with fac-similes of the drawings and sketches of the old masters. Thousands of copies have been made and distributed over the civilized world, from the folios locked up in museums and private safes in the capitals of Europe. The frail sketch, centuries old, through photography has become the property of any one; as much the resident of the wilds of a new country, be there cultivation, with even limited means, as of the wealthy collector of the metropolis. With the spread of art culture through literature, what a boon this is!

One reads of the wonderful works of Raphael, and Michael Angelo, and others, and if they have not traveled abroad are, at least, familiar with engravings from them, but to possess one or two of their off-hand sketches in fac-simile, is almost like being introduced to them in their studios; so completely does it let us into the inner working of the mind and hand of the man. In an artist's free sketch, wherein flow the off-hand workings of the imagination, one sees the character of the mind sometimes more clearly than in the highly wrought picture, which in its progress undergoes

a constantly refining and often toning-down influence; and in studying such sketches by different masters, it is remarkable to see what a wide diversity there is in the characters of different geniuses as given expression to in art. For instance, lay a sketch by Salvator Rosa alongside of one by Raphael, and compare the savage vigor of the former with the delicate, refined grace of the latter; or, put a Rubens and an Albert Durer together: how the full, rich, flowing grace of Rubens contrasts with the peculiar dry, methodical, and hard manner of Durer: and here let us deprecate all that criticism which in building up one hero tramples down another. How much of the writing upon art, in extolling one particular individual or school, finds nothing but glaring faults and imperfections in another, which, from a fair point of view, should be admitted to express as much talent in its way; it always being admitted that there is a conformity to some of the fundamental principles of art.

In art, as in many other matters, so little can be done towards giving a proper conception or appreciation by words alone, that those who are so fortunate as to have any interest in the work of the pencil and the brush are bound to hail with grateful delight the means which puts so much good and valuable art-work in our possession.

Now the writer would suggest as a pleasant winter occupation, for those who may not already have thought of it, the forming of collections of works of art, such as are out of the usual, and more rare, and yet may be got at by copying from works in libraries in the possession of friends of means, who would loan autotypes, etchings or engravings to be photographed by amateurs for their own gratification and that of a few friends.

What a choice lot and variety might be embodied in such an album! Then, again, the field could be greatly widened by adopting a system of interchange of such copies or albums.

The work is so simple that it may readily be accomplished by any one at all practiced in the art of photography; and as no additional apparatus beyond that used for good general work is needed, there is nothing to stand in the way of its being undertaken at once.

For those who wish to go thoroughly into the business of copying it is merely necessary to mention the following simple and necessary points to be attended to:

For copying generally any good, rapid rectilinear lens answers perfectly. The single lens, often used for landscape viewing, will not accomplish the work successfully, because it will distort or bow the marginal right lines of right-lined objects. In most cases, a long-focus lens is better than a wide-angle or short-focus one, because the latter will distort real objects more, and in copying flat objects, paintings, prints, etc., with glossy surfaces, will necessitate so close an approach to them, that the side next the light will be sure to glare. A lens of rather long focus will necessitate the use of a camera with a long draw, when the objects to be copied are small, or the addition of a cone to the front of an ordinary camera, which may easily be made with some thin wood, (parts of a cigar-box, for instance), and a little glue.

Care must be taken in copying prints to get them placed parallel with the face of the lens, so that the marginal lines will be square and the objects which they represent correctly portrayed.

The glare or reflection upon the face of oil paintings, photographs and the like, and especially such as have glass over them, which cannot always be removed, is a troublesome annoyance, and is but overcome in a good top or side light; the work being placed in such a manner as not to face the light too much nor to receive too skimming a light. The latter will show up the surface imperfections too much. Sometimes it is necessary to use a flaring box surrounding the object, painted dead black, or lined with black velvet on the inside. Care should also be taken that there are no bright objects about the camera or in any position from which they can cast a reflection on the surface of the work being copied.

As with most artist matters, some practice will soon beget skill, and as the work is proceeded with, and difficulties arise, a little ingenuity will readily overcome them.

Have you consulted our premium and clubbing list on the third page of the cover? If not, better do it at once; it may interest you.

RODINAL.

THIS new candidate for photographic favor is a clear, colorless liquid, which tastes slightly after sulphite of soda, and according to the printed directions is to be diluted with at least thirty times its bulk with water.

Exhaustive experiments have been made in Germany to test the properties and advantage of the new developer. Among others the following, which we find in the *Wochenblatt*, of Berlin, will prove of especial interest.

For this purpose two sensitometers were prepared from the same sheet of tracing paper, so as to be identically the same, and were arranged in twelve grades of density upon two thin glass discs. Under these sensitometers two plates were exposed simultaneously at a distance of about 10 feet (300 cm.) from a benzine light. Then both plates were developed, one with fresh rapid hydrochinone (Lainer formula), the other with Rodinal,—with the following results:

First trial.—Normal exposure 2 minutes 30 seconds. Rodinal 1:30. Both plates come up equally rapid. Development continued until the hydrochinone commenced to cause a slight fog. Both plates still show No. 11 after fixing. No. 1 is denser with Rodinal. It is surprising that with the new developer, Nos. 7, 8, 9, 10 come much denser than with hydrochinone.

Second trial.—Underexposure,—time, 1 minute. Developed as before. By continuing development until the hydrochinone showed a heavy fog No. 7 still discernible,—otherwise as above.

Third trial.—Conditions same as No. 1, except Rodinal reduced to 1:50. Result same as No. 2, except softer plates and finer graduations with Rodinal.

Fourth trial.—Four plates exposed 1 minute, and all developed successively with 50 c.cm. Rodinal 1:30. Time, 1 minute, 1 minute, 70 seconds and 80 seconds respectively, with equal results in all plates.

These experiments give following results, that Rodinal, even when diluted with water to fifty times its bulk, is still equal in reducing power to rapid hydrochinone. It however differs from the latter by its greater power and more intensive reduction in dimly lit places.

This peculiarity has without doubt been the cause that several experimenters attribute so much greater reducing properties to Rodinal than the older developers under similar conditions.

When no sensitometer is used, this impression becomes still greater, as the following trials show. For this purpose two plates were exposed, with a drop shutter in cloudy weather, aperture F 8, and F 16.

The two first were then tried with Rodinal and rapid hydrochinone respectively. They came up with about equal rapidity, and the development was continued until the hydrochinone showed a strong fog. After fixing it was found that the Rodinal plate resulted in a good negative, while the other was hard with glassy shadows, and showed a strong yellow discoloration.

In the two less lighted plates the difference was even still greater. The fog in the shadows of the hydrochinone plate was so dense that it was even denser than the half-tones, while the Rodinal plates showed no sign of fog.

In addition it was shown by the first series of experiments that a number of plates can be developed with a certain quantity of Rodinal, without perceptible difference in density and strength.

In regard to the keeping qualities of the new developer the following is to be mentioned, according to the published statement of the manufacturers. In original packages the fluid will keep without limit; after the packages are broken it will remain colorless for a long time.

In regard to the diluted developer the following trials have been made: When diluted with ordinary tap water, a light yellow fluid results, which in an uncovered graduate remained unchanged for about two days, after which it turned to a light orange, thence to a redish brown, after which small crystals and a yellow sediment formed. In a flat open dish the same changes took place, only more rapidly. The reducing power of the de-

veloper decreased with its discoloration, so that after a lapse of two days the solution gave only a hard negative, after long manipulation.

In all plates developed with Rodinal the great clearness and good color was noticeable. This first peculiarity, coming in all cases, is of great advantage, and must prove of great service in line work, as with the addition of bromide any degree of density can be attained.

In cases of overexposure, the developer may be tempered with more water, or the addition of bromide. The latter greatly retards development, but results in hard negatives. It has been found best to add some old developer in place of bromide.

When the requisite density fails, an addition of concentrated hydrochinone has been found to be of service, viz: About 5 c.cm. to 100 c.cm. of the Rodinal.

Hydrochinone	5 gr.
Water	100 c.cm.
Sulphite of Soda	10 gr.

Strong negatives of gray black tone and clear shadows have been gotten by these means, even after a strong overexposure.

On these grounds the writer assumes that the new agent Rodinal will prove a valuable developer for portraits as well as instantaneous exposures. For the former application the beautiful modulations shown in the sensitometer negatives give ample grounds.

Copying Music.—Sir George Grove, the director of the Royal College of Music, England, in a strong plea for the copying of the original autographs of classical music, in the London *Times*, says with reference to Beethoven's symphonies: "The published editions of such works, even the most careful, necessarily leave one but imperfectly informed of the real contents of the autographs. The very way in which the notes are put down in the bar in Beethoven's careful and shapely writing, the curious iteration of the marks of expression, and many similar things impress one, sentiment entirely apart, as nothing does in other musical autographs. Why should we not all have these manuscripts virtually in our own hands at our full disposal? Photography will give us the boon, and why should it not be employed? Photographic copies would be infallibly correct."

LITERARY LECTURES AND THE LANTERN.

PROF. W. HALL GRIFFIN, B. A.

THE lantern is now freely used for scientific lectures, and for those of a descriptive character. I am confident that it can be as usefully employed for literary purposes, and hope soon to see it abundantly so used.

My own ideas as to the employment of the lantern have simply grown out of my experience of the need of appeals to the eye to supplement those to the ear. I have found this as a public schoolmaster and as a lecturer. I have for years employed stenciled charts for history and literature, and have supplemented these by the use of photographs, portraits, etc., etc.

My slides for literary lectures I would class under three heads:

1. Those which illustrate the *lives* of writers. Such views are always of interest, and, although not *directly* helpful to the understanding of literary works, they serve to give reality to facts mentioned, and to bring home the surroundings of a writer in such way as to arouse interest in the works themselves.

Among such views I class portraits, so many of which Messrs. Mansell, of Oxford street, now supply in their "Literary Series"; views of the homes and haunts of our writers, autographs, etc. These awaken great interest when they serve as illustrations in our books (as they so freely do now), and I have found them as useful in lecturing.

My own idea of their use educationally is to bring out as fully as possible the circumstances under which works were produced; to deal with the home of the writer, we will say, and then take the works produced there. This is often most useful.

2. Views illustrating the *works* of writers. Any such views have a distinctly *educational* value, besides being of interest. Very often the views already spoken of are of this character; for the surroundings of a writer being known, one often sees the source of the illustrations he uses or the descriptions he gives. Scott and Wordsworth are instances of the possibilities in this direction.

But what is true of these two is true, in a degree, of all writers. No one who has not studied the question has any idea of the amount of useful, helpful illustration that may be given. Some wonder has been excited by my attempting to illustrate Browning. May I give an instance of the possibility? Take the well-known poem, "Andrea del Sarto."

(*a*) A picture hanging in the Pitti Palace, at Florence, shows the painter in conversation with his wife. The sadness of the expression on the painter's face, excited, it is said, Browning's interest, and suggested the monologue put into his mouth by the poet. I use a slide to show this picture.

(*b*) The famous portrait of Andrea in our own National Gallery is said to have influenced the treatment of the poem. This, therefore, is shown. It all serves to connect the unknown foreign picture with what should be known to all here.

(*c*) A view of Andrea's masterpiece in Florence, and of his Madonna in our own gallery, as well as a portrait of his wife (in Madrid), serve to bring out the fact (referred to in the poem) that the wife was his model for the Virgin, as well as to exhibit the work of the "Faultless Painter."

(*d*) A view of the house in which Andrea lived in Florence (the house Browning had in his mind in writing the poem, and where he imagines the conversation to take place) also serves to quicken interest, and to make the poem more real.

(*e*) A few views of the surroundings of that house, the church and its garden, nearly opposite, the view up the road to the hills of Fiesole (all of them in the poet's mind as he wrote, and all referred to), are other illustrations.

Now, I have chosen this, a somewhat favorable instance, because I have found that many students of the poem had *no idea whatever* that reference was so often made to real places, events, and people, and they have shown the greatest interest in the views. I use it to enforce the remark that only a close study of works can enable any one to realize how much aid the lantern can give in developing the depth of meaning or, in giving reality to such works.

Such views would illustrate passages which would be read while the views were on the screen.

3. Many works (let me keep to poems) are incapable of such illustration. As the *Daily Telegraph* remarked in its leader on the subject: "The ode 'To a Skylark' would not be rendered any more delicious than it is by a magic-lantern slide depicting the bird in the act of soaring heavenward." Quite true. But my third class of slides consists of passages from poems (printed passages) thrown on the screen, so that what is read or criticised may be before the eyes of all. The audience at once become audience and spectators, or, as Bunyan might say, "Eye-gate and ear-gate are attacked at once."

The use of such slides, accompanied by the other two kinds, is obviously advantageous. I also have charts of the lives of writers, and in some cases an analysis of a work, etc., as slides. By the use of those slides, passages can be *compared* far more efficiently than by mere appeals to the ear. It also allows of a passage (when needful) being kept before the eyes of all, so as to enable a more detailed criticism to be entered into; a criticism of any of those smaller points which are apt to be more wearisome when the passage is not before the eye.

Also, such slides enable poems to be dealt with (the "Skylark", for instance, which cannot be illustrated). The beauties or defects of a poem can be far more efficiently pointed out when the *reading* of passages and the comments are accompanied by the appeal to eye. It also serves the practical purpose of keeping up the continuity in the use of the screen, which seems to me needful in the lantern lecture—in most cases, at least.

The labor involved in arranging such a mass of illustration is, of course, very great; but I hope to see a great development in this direction, one of the best means, I am confident, of arousing interest in the study of the lives and works of our great writers, poets, and thinkers helps.

Glass for a Big Lens.—There is now being finished at Greenville, Pa., a disk of glass for a refracting telescope lens which is claimed as the largest that has ever been made in the United States. The disk is 30½ inches in diameter by 5⅛ inches in thickness, and weighs over 300 pounds.

PHOTO-ETCHING AND PRINTING.

CARL NEMETHY.

THE value of photo-mechanical reproduction for printing purposes is mentioned but little, although it is now known throughout the civilized world. We can positively say that the methods of reproducing fine art subjects are invaluable to the printing trade, and this alone may serve as the best proof of the great value of the photo-mechanical reproduction. In mentioning the printing trade I do not desire to mean simply type printers, who, no doubt, do partake the greatest benefit of all, but also the stone, copper and gelatine printers, who now cannot get along without the photographer's help.

Let us look backwards about ten years. What wonderful changes and developments can be shown in the printing trades since the photo-process of engraving was first introduced. Then the idea of almost everybody was to find a substitute for the wood-cut. If a photo-reproduction did not look like a wood-cut it found no admiration: it was simply no good; the original design of the artist was not admired, though it was given as true and perfect as the drawing itself.

At first, we began by reproducing wood-cuts and autographs, and later, by improved methods of etching, we reached the point where we could produce a plate with the finest lines and dots, showing a perfect, clear picture, and etched as deeply as, or more so than, the finest wood-cut ever made. The great benefit of this new etching method is the durability of the plates, the assurance that the reproduction is as perfect as the original, and then the large saving of time and money in execution, and the fact that the original cut can be used, by proper overlay, for an edition of 50,000 to 100,000 copies without fear.

A good plate cannot be produced by accident, nor is it a simple mechanical result. There is as much skill, taste, knowledge and talent required to make a good negative as there is to any other

kind of artistic work; and a good etcher is fully entitled to be called an artist.

The fear of some printers to adopt plates made by this method of illustrating is a natural one, as most of the exhibited sample proofs are presented to them on the finest coated and most expensive enameled papers, pulled off with the greatest of care, with the assurance that the cut does not need to be prepared with overlays! When the printer took hold of one of these cuts and acted on this statement, he could not get a good result, as he put the cut in a big steam press, and printed type and cut at the same time, without overlaying it, to his own and the public's disgust. He then, naturally, claimed that the etching was not deep; it filled up; was gray; flat; spotty, and blurred. Indeed, it is hard to induce a printer who has handled one of these cuts in the way stated, to take another executed by some one who is an expert in this line, and would give him the instructions how to print it.

I admit that printers have just cause to complain about some of the photo-made plates sent to them. Why not? when it is known that there are people who buy instruction books for twenty-five cents which assume to teach the whole photo-etching process in from two to three weeks' time, and then start into business and announce to the public to be able to produce first-class work! when it really requires years of study, practice, skill, talent and taste. There is just as much difference between etchers as there is between a first-class star of the stage and an amateur actor; the latter may be admired by his friends and family, but not so the amateur etcher or reproducer who claims to be an expert and claims to know (per his twenty-five cent. book) as much as an experienced and skilled reproducer who has worked for years at that art.

The development of our etching process has kept step with the improvement of the age since 1884, and we are now able to produce a cut as nearly perfect as a photograph. Previous to this time the original had to be redrawn by pen or crayon, to form lines or dots, which were reproduced by photo-process and etched.

The origin of the experiments of reproducing a picture more perfect than a lithograph or wood-cut, and direct from the photo

or object, was conceived about ten years prior to the date mentioned by Petit, Goupil, Monsot, Ives, Jaffe, and Angerer; and in 1879 we had several proofs of half tone reproductions from Vienna, though not perfect enough to be published.

Meissenbach, of Munich, was the first to produce good results in half-tone etching; but to-day new methods and new ideas are so far developed in many others that no one works by his process. We can now reproduce an oil or water-color painting, India ink or crayon, pencil or charcoal drawing, a steel or copper engraving, a lithograph, in colors or black, as perfect as the original, and in a surprisingly short time, combining all the character and genius of the artist in the reproduction, thereby illustrating the value of this method.

Thus have we been enabled to see some of the old masters and treasures of many hundreds and thousands of years ago by means of the new photo-etching methods, which have furnished an illustrating medium to bring before us, over and over again, those invaluable collections of ideas of our forefathers. The wood, steel or copper engravings, and other expensive methods, never could have brought these treasures before the public. Indeed, the increase of illustrated dailies and weeklies during the last ten years attests the value of the photo-process.

With the improvements acquired by this great illustrating medium industry, science and education grow day by day, by its examples of skill; and the reproduction of a piece of art does not now belong exclusively to the photo-gravure printer or copper or steel engraver; it is now the letterpress printer who handles the common type press, and its rapid means of production benefits all. Still, it is plain and clear that the works of the former are much admired, and they will keep their place as artists no doubt for ages in a certain line. But for cheap yet artistic means of illustrating, the most perfect and only way that I can see is that of the type method of printing from photo-etchings.

The result of a fine etching is as much a work of art as that of any other reproduction method, for the etcher has to use his brain and skill to etch the fine and delicate lines of the design,—equally as much so as the engraver has to do it with his tools or the painter

his brush. The sun or electric light and the chemicals do not do all the work: the skill of the etcher is what is needed to bring life into the etching.

Why do we not get good results from the products of all the engraving or etching concerns? Because the machines do not work alone, and the fine outfits and choice chemicals do not turn out perfect plates. Still, practice and a thorough knowledge is required to have a first-class result: without these all else is useless.

The printing trade has also gained another invaluable field through the photo-mechanical process for printing in colors. Pictures which by lithography often required as many as twenty plates, can be beautifully executed with eight or ten colors, by the modern photo-etching method. With four plates we can produce a picture that is more beautiul than a lithograph can be with the same number of colors.

The photo-etching is the great medium of the future for black as well as color printing, especially where one hundred thousand and more impressions are necessary. Certainly the simple first-class photo-etched plate of itself is by no means sufficient to produce an artistically perfect picture. The printer's part of the work must be done in the same earnest manner as the etcher's. He has to use his skill, taste and knowledge, and he can thereby produce a piece of art in his line.

The most artistic yet the most difficult of all methods of reproduction by photo-mechanical processes, is the "Cromotypogravure." This is still in its infancy; and it is really impossible to state what growth and importance it will reach in the near future. It is the perfection of photo-mechanical processes, combined with the skill of an artist who can perfectly produce relief etched metal plates that can be used in an ordinary type-printing press for colored pictures. The reputation of type-press printing in colors has already reached an eminent place amongst high art, and this is now largely due to the aid of the photo-mechanical processes which are about the only medium for reproducing art pieces, provided the execution is placed in the hands of masters of this new and advancing art.

Some years ago the idea of making color plates by this process was laughed at, especially in competition with the well developed art of lithography. With little encouragement and no assistance I made plate after plate, until I reached the point where I can say that an etching can be produced which can stand the scrutiny of any critic, and which is more adaptable for artistic commercial work than is lithography. It is not because the letter-press can be run with higher speed than can the litho-press (although this is the point where the saving comes in), but it is because of the fact that a picture produced by letter-press printing is more effective and brilliant when five colors are used than is a litho-print in seven or eight colors; and if eight plates are used by typographical printing, the brilliancy of a litho-print produced by twelve is obtained. Those who can handle color plates easily can appreciate the importance of a reduction of three or four plates on a job.

Printing several colors on top of each other must be done very carefully, and the print must be perfectly dry before the next color can be printed, and with each additional color the difficulty grows: because if sufficient time is not given for one or the other of the colors to dry the whole work may be spoiled, as the colors will mix and produce a spotty and dirty picture. The printer who handles this class of work, being mostly an artist, cannot afford to spoil both his reputation and a large edition of such work. A good result can easily be obtained with plates produced by great care, artistic taste and ability.

The process and art of producing such color plates is kept secret by most of the establishments, and nearly every one has its different method. The Orthochromatic process is the one commonly used, and only very few artists can handle the different negatives for preparing (retouching) them for this work, which is far more difficult than the drawing on stone for lithographing. Perfect knowledge of colors and color-combination effects, long practice, and a natural taste and talent, is required to give the reproduction the trueness and effect of the original, yet this is the only way the artist's work can be produced without any change of its character, and the peculiarity of his handling the brush.

The artist printer has not the easiest part of the work, even after the most accurate and perfect plates are put into his hands, and we often ask more from him than from any other person connected with the production of colored work. He must have the thorough knowledge, skill and practice of handling the finest illustration cut. Science, taste and ability in selecting, and mixing, and applying the colors are of the greatest importance; and the cleanness and care in handling this work tends to the great secret of a successful result.

Each plate must be properly handled, and a most perfect overlay (even more so than for black printing) is required, and the proving and make-ready of each plate should be done in the proper color necessary to produce the required effect; otherwise a good result cannot be obtained. It is best to mix sufficient color for the whole work, as the same exact shade or tint can hardly be mixed again, and sometimes the slightest difference in tone will change the effect of the whole.

The paper should be rather soft and medium sized (or glued), not too hard and not too heavily coated, as the ink cannot soak in sufficiently and may pull off; nor is a too soft or unglued porous paper good, as it soaks in the ink too much, and gives a dull and dead look to the picture. The ink should be pure, finely ground, and very smooth, with but little artificial dryers, as the clearness and the softness of the ink is spoiled. The pure body color will dry the quickest, and will not change after it is dry.

During the last ten or fifteen years the number of the reading public has reached such an enormous height that not only the larger cities but every city is supplied with means to produce illustrated reading matter in great quantity, thereby stimulating the education and taste for art. This alludes mainly to works in black or one color, and since the photo-mechanical processes were adopted generally. Still, I must add that I believe that the color picture will be the illustration of the future, and this by the letter-press methods of printing from photo-mechanical plates. —*American Art Printer.*

ADAPTATION OF PHOTOGRAPHY TO PRINTING IN COLORS.

THE *Petit Journal*, of Paris, has just put out a new weekly publication with colored illustrations. It may be of interest to show how photography has been used in obtaining the typographic printing blocks. The attention of the great printing establishments of the whole world has been directed to the appearance of a rotary printing machine, which, receiving the white paper in rolls, converts it into a journal printed in four colors, and this at a rate of 12,000 copies in an hour. This result is due to the ingenuity of the celebrated engineer Marinoni, who, for the adjustment of the different monochromes has had recourse to photography. The colored picture of the artist is photographed by Messrs. Vallot Bros., who use for this work isochromatic preparations and colored screens, in order to obtain the relative values of the different tones of the original. From this negative, skillful workmen print four positive prints, which are transferred to wood; the work then passes into the hands of the art engraver, Mr. Meaule, who engraves on each of the blocks the cuts necessary to obtain in the printing all the lines which will deposit on the paper the same color. The blocks are then confided to a worker in galvanoplasty, who moulds and deposits the copper in sufficient quanity to take the place of the wood, and form the metallic block to be used in the printing. The metallic block is strengthened by running lead on the back, then bent according to the diameter of the cylinder of the machine upon which it is fixed.

By the aid of an ingenious contrivance of M. Marinoni's invention the sheet of paper is printed in one color by passing under a first block; immediately it presents itself under a second block, which prints the second color, in the same manner under the third, and finally under the fourth block, which limits and forms the connection by printing the text. With these superposed colors, and by the intervals showing the white of the paper,

it is possible to obtain the delicate tones of the aquarelle. This rotary machine, by using colored printing inks, has overcome a difficulty existing when chromo prints are made requiring four impressions. M. Marinoni is now preparing a machine for printing in six colors.—*Progress Photographique.*

MAXIMS FOR THE PROFESSIONAL PHOTOGRAPHER.

BY J. FOCUS SNAPPSCHOTTE.

AS a remedy for the prevailing cry of dull trade among a certain class of professional photographers, the following maxims are submitted for their consideration. It is not claimed by any means that they are all new or original, in fact some are patterned after "Poor Richard" of old,—perhaps a long way after,—others again are the result of the writer's own experience and observation in his rambles around among the craft.

A careful perusal of the list however will be found of far greater service to the professional photographer whose business is lagging, than volumes of essays by platitudian space writers, upon such subjects as, "Will glass floors in our studios overcome the heavy shadows under the eyes," or chapters of matter upon the peculiar chemical charges of the haloid salts during exposure, whether the Ag. Br. becomes Ag. 2½xBr. 3 3-16 or Ag. 2⅝xBr. 3 5-32.

Read the list carefully, and make a note of the special maxim applicable to your case, and then act upon the advice, and the writer's word for it, if your work is good and the prices right, you will soon have no time to growl and complain about the ruination of photographic portraiture by the advent of the five-dollar hand camera.

1. We can make the times better if we better ourselves.
2. Subscribe to and read at least two photographic periodicals.
3. Keep your studio, and your studio will keep you.
4. Watch the advertisements in the AMERICAN JOURNAL OF PHOTOGRAPHY.

5. Remember that attention to business and industry pay your stockhouse bills.

6. Allow no lounging in your reception room.

7. Promptness is your most successful advertisement.

8. Do not encourage social callers during business hours.

9. To-day is worth a week of to-morrows.

10. Be careful of your wastes,—they count up in a year.

11. Lost time is never found again.

12. Have Volume XII, of the AMERICAN JOURNAL OF PHOTOGRAPHY bound, and keep handy for reference.

13. Drive your business; do not let it drive you.

14. Pay your bills promptly; you buy cheaper and earn the discount.

15. Time enough, always proves little enough.

16. Keep abreast with the times.

17. There are no gains without pains.

18. Politeness and civility cost nothing, and often bring large returns.

19. Sloth, like rust, consumes more than labor wears.

20. Cater to the refined tastes of your customers only.

21. Diligence is the mother of good luck.

22. Be courteous to ladies and children under all circumstances.

23. Never leave that until to-morrow which you can do to-day.

24. Always offer your suggestions to a sitter with deference to his wishes.

25. Remember the eye of the master will do more work than both his hands.

26. Do not relegate the care of your show-case to your errand boy.

27. A small leak will sink a great ship.

28. Keep a constant watch upon the lesser details of your business.

29. Do not spare the broom, scrubbing brush and duster—they cost but little and soon pay for themselves.

30. He that lives upon hope will die fasting.

31. Try to please your customer, even if his desire be contrary to your ideas.

32. Cheap help is usually dearest in the end.

33. Insist upon neatness and cleanliness in all your employees.

34. Always taking out of the meal tub, and never putting in, soon comes to the bottom.

35. Permit no use of tobacco in any part of your gallery.

36. Be gentlemanly to the lowly,—their money is as good as that of the rich.

37. Remember gain is always uncertain, often but temporary: your expenses, constant and certain.

38. Want of care in your establishment does far more damage than lack of knowledge.

39. Not to oversee your assistants in studio and laboratory is to leave them your purse open.

40. Keep the entrance to your gallery clean, and make it inviting to the passer-by.

41. Never size up a customer by his clothing.

42. Truth and honesty always pay in the end.

43. Calculate well the probabilities of the future, and make your arrangements accordingly.

44. Cleanliness is more important than gaudy accessories.

45. Seek to impress your visitors by the appearance of your establishment.

46. Never stoop to deliberate falsehood to effect a sale.

47. To compete successfully with a neighbor, participate in the facilities offered to go ahead.

48. Seek to establish yourself on the broad and sound basis of *integrity*.

49. Bear in mind we can give you advice, but cannot furnish common sense.

50. Last but not least, if you have not already done so, renew your subscription to the AMERICAN JOURNAL OF PHOTOGRAPHY, without delay.

How good-looking some of us would be could we only live up to the photograph which we regard as a perfect likeness.—*Boston Transcript.*

A TALK ON NEAT FRAMES FOR PHOTOGRAPHS.

EVERY housewife has a loving eye for dainty photograph frames, because they are so linked with loving associations of the friends whose faces they frame. And especially in the present season talks about these things seem interesting almost to enchantment.

If you can afford it, the better plan it to begin your work by ordering of a stationer some heavy foundation cards cut from heavy cardboard, in the shape you may desire, two cards being required for each frame; but if economy is a consideration, and you make your measurements very carefully and cut them very exactly, you can save the ten cents a pair which is the usual cost of the cut cards. Next, provide yourself with a pot of strong, well-strained flour paste, in which some gum arabic and a bit of alum have been added before boiling. Any material almost may be chosen for the covering,—handsomely-figured English cretonne, gold-stamped Japanese cotton crepe, printed India silk, or the beautiful brocades of French looms,—these, if you do not wish to do the decorating yourself.

If you are skillful with your needle or brush, most beautiful results can be obtained either by painting or by embroidering with fine flosses and occasional gold or silver threads upon pongee, ooze leather, chamois skin, kid, heavy silk, or one of the endless weaves of linen which lend themselves so kindly to the decorator's needs. The embroidery should, of course, be finished, and carefully pressed before pasting the fabric to the frame, but painting is much better done after the frame is made. Having selected your covering, lay it right side down upon a table, placing the foundation card also right side down upon it, and cut the cover, leaving plenty of margin. Paste back this margin very carefully, giving especial attention to the fitting of the corners, and the perfect preservation of the curves of the

opening, which may be secured by snipping the material close to the card and pressing the little slits thus made firmly into place. Place the gummed cards between foils of soft old muslin, and lay these between many layers of newspapers under a heavy weight. Before they are perfectly dry take them out and iron them slowly until they are stiff. Now gum the pairs together ou the top and sides, leaving the bottom open for the insertion of the photograph, and dry again in the same way. If you want to make a three- or four-fold frame, gum tiny ribbon hinges between the pairs of faces before the second pasting, and if you wish a single frame, make a standard of pasteboard, covering it with the same material you have used for the frame, and gum it strongly to the back by means of a bit of the stuff, which you have made longer than the standard.

A very pretty frame may be made in much the same general way, although fine very overhand sewing gives a better result. No opening is cut in the two cards, both sides of each being smoothly and evenly covered with the material. Across the top and bottom of one card folds of the material, enriched with embroidery and lined with plain linen, are carefully sewed, and between these folds the photograph is slipped, the dotted line in the design showing its position. The tops of the two cards are over-handed together, and the one side is made to do duty as prop for the other when open, or as cover when closed.

In much the same fashion is made the heart-shaped frame. Gum a thin layer of cotton wadding over the face of the heart, and over this a piece of yellow India silk. On this paste a cover of bolting cloth on which buttercups, natural foliage, have been embroidered. After the standard has been fitted, sew a fine gold cord all around the heart.

Finally, very charming little frames for the tiny portraits now so popular are cut from heavy whatman paper in the form of some favorite flower,—a pansy, a daisy, or a four-leaved clover, with an opening in the centre large enough for the pictured face. Paint these forms with broad washes of color, sharply defined lights and shadows, and outline each petal with a tiny line of gold or silver paint. Paste on a back and standard of heavy white bristol board, and you have with very little trouble or expense a very pretty trifle for your own boudoir, for you friend, or for the faney fair in which you are so much interested and for which you have been wishing for "something new."—"*Delaware,*" *in Philadelphia Inquirer.*

Dust is one of the greatest enemies a photographer has to contend with.

THE PHOTOGRAPHIC CONTEST OF THE BUFFALO "EXPRESS."

AMATEUR photographers contributed very materially to the make-up of the *Buffalo Illustrated Express.* If any one fancies that the word "amateur" implies inferior work, let him study the beautiful specimens of photography that adorn these pages, and revise his judgment. The following extract is from the issue of December 20th, 1891, and will be read with interest by the many friends of the successful competitors, viz:

The *Express* amateur photographers' contest began September 27st and closed December 14th. Within those dates nearly 3,700 photographs were received from all parts of the country. The success of the enterprise was far greater than we had dreamed of. Within a week from the timc the first announcement was made we knew it was "a go." Before the month was up we began to wonder whether everybody was an amateur photographer. At the end of the second month we knew that practically everybody was either an amateur photographer or took a lively interest in the work. We have received not merely photographs by the thousand, but scores and hundreds of letters from all parts of the country in regard to it.

Two great classes of work were made, the "general camera" and the "Kodak" class, with two prizes of $25 and $15 in each. On this page we give three prize-winners in the "general" class, an extra $20 prize having been created in order that we may more satisfactorily recognize as much of the superior work as possible. The pictures which receive the prizes have been selected only after the most painstaking examination and comparison. The merit of every picture received has been considered under the following heads and on the following scale:

	Per cent.
Artistic value of the composition, whether figures, landscapes, or other subject,	.25
Originality of conception,	.25
Illustrative value,	.25
Technical excellence (either in the negative or in finishing the print),	.25

It will suffice to say that in the committee on award the judge on this point of technical excellence was Mr. H. McMichael, ex-president

of the American Photographers' Association and a professional photographer of the highest reputation, who has often served as expert judge and referee among his professional brethren. It will be noted that the pictures which receive the first and second prizes have the same total of credit—85. This was the result of the marking by four judges without consultation,—*i. e.*, each valued the picture in his own department. regardless of what value the others had put on it. There being a tie, manifestly the just thing to do by the competitors was to consider their other work. The merits of this, as shown in the table, clearly entitled Mr. Clarence B. Moore, No. 1321 Locust Street, Philadelphia, Pa., to the first prize, though we assure that gentleman that if the phrase "First among equals" were ever true, it is so in his case.—*Buffalo Express*, Dec. 20th, 1891.

Historical America.—A meeting to further local representation at the Historical American Exhibition that will be held in Madrid, Spain, from September 12th to December 31st, 1892, was lately held at the Franklin Institute, Dr. Jose Congosto, the Spanish consul in this city, presiding. Among those present were A. G. del Campillo, delegate-general of the exhibition to this country; Dr. Persifor Frazer, Dr. Daniel G. Brinton, Dr. Juan Guiteras, Professor E. D. Cope, Charlemagne Tower, and Dr. Charles C. Abbott. It was decided to issue a general circular to enlist popular support from this locality.

The University of Pennsylvania, Academy of Natural Sciences, and a number of private individuals have signified their intention of contributing American historical articles to the exhibition. The exhibition will be purely a historical one to commemorate the fourth centennial of the discovery of America under Spanish auspices, and will embrace a complete collection of documents relating to the discovery and conquest of the New World, together with all objects that will give an idea of American history anterior and coëvual with that epoch. In addition, native industrial arts and American fine arts up to the middle of the eighteenth century will be displayed, to secure which much depends upon the assistance rendered by the citizens of this country.

The Madrid exhibition will in no way conflict with the Chicago World's Exposition. On the contrary, many articles of important historical interest will be sent from there to Chicago. The articles to be exhibited will be forwarded to Madrid and returned at the conclusion of the exhibition at the expense of the managing committee, which also guarantees the safe return of the exhibits.

ARTIFICIAL HUMAN EYES.

THERE are so few makers of artificial human eyes in this country that a chat with a specialist in this peculiar industry must always prove of particular interest. We had the pleasure recently of an interview with Mr. Thomas Pache, of the firm of Pache & Son, of Great Charles Street, Birmingham. Mr. Pache favored us with an inspection of some of his stock, and we were astonished to learn that he keeps upwards of 4,000 eyes always on the premises. We were still more surprised to learn that in spite of this large selection in most cases Mr. Pache finds it necessary to make an eye to order. "I suppose, Mr. Pache," our representative observed, "you manage to get good prices for your eyes?" "Sometimes," was the reply, "but you would be astonished at the way some people will haggle over a few shillings in the price of this specially designed article." The firm has a large hospital connection, and patients are sent to them for the purpose of having new eyes fitted as well as supplied. Mr. Pache is a great "stickler" on the subject of proper fitting. He complains that many dealers, who merely buy, are not at all particular as to whether they fix a right eye into a left socket, or vice versa, as long as they have in stock something approaching in color to the remaining optic. It is a fact little known to those having no experience in this peculiar work, that the artificial eye is not inserted right away into the empty socket. The patient wears a small concavo-convex glass shell for a few days in order to keep the eyelid open and to accustom the socket to the use of the new body. We were particularly interested in a case containing thirty-six models of the eye in various morbid conditions. Anything more horribly beautiful or beautifully horrible it is impossible to conceive. The models are exquisitely designed, and should prove of immense value to hospital students. We think such a case should be owned by every ophthalmic hospital, as these models convey a better idea of the various forms of diseases than the most carefully executed water-color drawings can do. In an early issue of *The Optician* we commented upon the hereditary nature of the optical industry, and remarked on the fact that in some workshops three generations of the same family of workmen might be found at the same bench. This is nothing when compared to the artificial-eye industry. Messrs. Pache retain the services of all their own family, and do not employ a single strange workman!—*The Optician.*

Lantern Flashes.

Mr. T. C. Hepworth, F.C.S., editor of the *Photographic* (London) *News,* lately gave an instructive and amusing lecture at Middelton Hall, in London, under the auspices of the National Sunday League. The subject was: "The Marvels of Modern Photography," with lantern illustrations. A large and appreciative audience was present and passed an enjoyable evening, frequently applauding the lecturer.

A dissolver for a single lantern has been invented in England. If this new apparatus should prove a practical success it will supply a long-felt want, which the owners of sciopticons and other single lanterns will know how to appreciate.

A Novel Printing Frame.—Mr. A. R. Wormald, of Sutton, Surrey, has invented an ingeniuos frame for producing lantern slides by contact from any size of negative, whole plate downwards. By means of this new frame the difficulties and loss of time in adjusting and holding negatives in working position for contact printing in an ordinary printing frame are avoided as well with quarter-plates as larger negatives. Many other advantages, including accurate centring and parallelism of vertical and horizontal lines with the side of the lantern plate, are secured. This new frame, moreover, offers unusual facilities for printing in skies on the slides. Our informant, who has seen the new frame, considers the apparatus an excellent and useful invention, which, it is thought, will bring about a revolution in lantern-slide making.

Contact Printing.—In making lantern slides by contact the length of exposure required varies according to the density of the negative and the developer used, negatives developed with eikonogen yielding excellent slides in less time than the same subjects developed with hydroquinone or pyro. It is best to have a fixed distance from the light for exposing the printing frame, and to vary the time of exposure according the printing qualities of the negative. By adhering to this rule little practice and experience soon generates confidence and enables the operator to make his slides with as little trouble as an ordinary negative.

Renew your subscription for 1892.

The Editorial Dropshutter.

Wanted—A flash-light compound free from smoke or objectionable gases.

The amateur photographer who is not a lanternist loses one of the greatest enjoyments connected with our art-science.

A patent has recently been granted in Berlin, Germany (D. R. P. 60,174), for the application of p.-amido.phenol and p.-amido kresol as photographic developers.

According to the *Chemiker Zeitung* we learn that the new patent color *Echtneutralviolett* of commerce is merely a product of dialkylmphenylendiamin and nitrosodimethylanilin.

The long winter evenings now give ample opportunity for lantern work and flash-light experiments,—two divertisements unknown to our fathers in their youth, and now brought about by modern photography.

The establishment of Simpkinson & Miller, photo. stock dealers of Cincinnati, Ohio, was badly damaged by fire on December 12th, 1891. With commendable energy temporary quarters were at once secured, and the business was resumed without delay.

Our contemporary, the *American Art Printer*, brings out as a supplement our illustration, "A Study in Posing," in an exquisite halftone, 9½ x 7, under the title "Cleopatra." The etching shows graduations of color as can only be found in Philadelphia-made plates.

When your negatives come thin and flat, especially after you have been photographically idle for a month or two, do not condemn plates nor developer, but examine your camera to make sure it is light-tight; also see that your lenses are clean and free from dust. A coating of the latter results in poor negatives.

Toledo Camera Club.—On New Year's day the ladies of the Toledo Camera Club arranged a New Year's reception at the club-rooms, from 8 to 10 P.M. It was an enjoyable affair, and pleasant memories will no doubt linger in the minds of many who were fortunate enough to be present. The success of the entertainment is due to the efforts of the following ladies, viz.: Mrs. F. C. Wade, Miss Bessie Canniff, Miss Maud Canniff, Mrs. F. S. Anable, Miss J. Jay Coon, Miss M. Georgia Ormond, Mrs. Lotta R. Wright, Mrs. H. E. Richards, and Miss Helen Marble.

Remember, a slide upon the screen shown to a roomful of people makes a far different impression than the same subject in the shape of a small silver print, although from the same negative. The former results in admiration and applause, while the latter is passed listlessly from hand to hand without note or comment.

How few professional photographers are willing to furnish a sitter with a lantern slide from the negative. Why should this unwillingness exist? Every professional with any pretension to portraiture should be able to produce as good a slide as silver print. Further, it would add to his income, and the slide wherever shown would certainly be a gratuitous advertisement if the character of the work warranted it.

American Superiority.—It is not generally known that the fine bromide enlargements now being distributed over the country by the New York Central Railroad, representing the "Empire State Express," are from a negative made by Mr. A. P. Yates, of Syracuse, N. Y., taken with an American lens and shutter (Bausch and Lomb Rapid Universal and Diaphragm Shutter) while the train was running at the rate of fully sixty miles an hour.

One of the neatest and most unique New Year souvenirs which have reached us is one from Ralph D. Cleveland, Esq., of Minneapolis, Minn. It consists of three folds of rough rag paper of various tints, with serrated edges fastened together with a white silk cord. A tinted photograph on plain paper is mounted lightly on the four inside pages; these represent "Minnehaha Falls in Winter," "Minnetonka," "Fort Snelling," and a group of "Birches," the whole forming an artistic souvenir.

We acknowledge the receipt of a "Catalogue of Photographs of the Newark (N. J.) Camera Club." It is souvenir of the first annual exhibition held November 23d to December 5th, 1891. The Exhibition Committee, Paul L. V. Thiery, Dr. Chas. A. Meeker, and Wm. A. Halsey, are to be congratulated upon their success, considering the fact that the club was only organized in April, 1888. The progress made by the members, as shown by the catalogue now before us, is truly wonderful.

What greater bore to a visitor is there than the family photograph album, and why? Because in ninety-five cases out of a hundred the cards are inserted in a careless or slovenly manner, without any reference to the relation of the subjects opposite or following each other. Necessarily the majority of portraits in the album are unknown to the

casual visitor, and at best can interest him but little. Now try and arrange your portraits, no matter whether family or public, with some pretension to system and order, and you will be surprised what a difference it will make in holding the attention of your visitor.

Toronto Camera Club.—At a recent meeting of the members of the "Toronto Amateur Photographic Association" they unanimously resolved that the name of the association be changed to that of "Toronto Camera Club." The officers of the club are: W. H. Ellis, M.D., *President;* E. H. Walsh, *Vice-President;* R. G. Muntz, *Secretary;* and R. S. Clarke, *Treasurer.* The club is in a flourishing condition, and has lately secured enlarged quarters at the corner of Yonge and Gerrard Streets, where a large studio has been specially built for photographic requirements. In addition, there are dark rooms supplied with every requisite for developing, enlarging room fitted with 100-candle-power electric light enlarging apparatus, printing and toning room, etc., together with the use of sundry valuable apparatus and backgrounds. It is now hoped that with everything provided for the needs of the most enthusiastic amateur there will be a great influx of new members. The annual subscription has been placed at the low figure of $5.00.

A Questionable Business Method.—L. H. Sawyer, an elderly photographer, 159 North Eighth Street, Philadelphia, was before Magistrate Clement lately upon the charge of assault and battery upon Eveline Butler. The prosecutrix testified that she accompanied her sister, Lizzie, to the defendant's place on Friday. The sister gave an order for photographs of herself. Sawyer asked Eveline if she intended to have some photographs taken, and when she said she did not he said that he had prepared the plates and she would have to pay him twenty-five cents.

Miss Butler demurred, and, so she alleges, the defendant planted himself against the door, and when she attempted to leave he roughly pushed her back. She became afraid and gave him the money. Lizzie Butler corroborated her sister's testimony.

Sawyer's defense was that Eveline had ordered a picture, and after he had arranged the plates she refused to sit. He informed her that she would have to pay him, and he gave her a receipt for the money, which entitled her to two tintype photographs of herself. Sawyer was held in $500 bail.

Renew your subscription.

Photographic Hints and Formulæ.

To separate stamps from each other, place them between clean, thoroughly moistened pieces of blotting paper, and leave them until they separate easily.

To Prevent Curling of Aristo Prints.—To obviate this annoyance add a small quantity of alcohol to the toning bath; or, better still, soak the prints in alcohol before toning.

To Make Writing Look Old.—Take one drachm of saffron, and infuse it into one-half pint of ink. Warm it over a gentle fire, and anything written with it will turn yellow and old-looking.

Something Handsome.—"I hear that Miss Upperbridge gave you a handsome Christmas present?" "Yes, she did." "What was it?" "She returned my photograph."—*Oil City Blizzard.*

Celluloid articles which may have been broken, and are considered valuable, can be mended by covering the broken edges with glacial acetic acid, and pressing the pieces together firmly until dry.

Photographing Speech.—Instantaneous photography has been used to record the movements of the lips in speaking; and by putting the photograph in a zoetrope a deaf mute can easily read the words, says a daily paper.—*Times.*

To prevent the loss of your pencil through having it slip from your pocket, put a rubber band around one end. The rubber clings to the lining of the pocket, with tenacity enough to prevent the pencil from falling or being jostled from the pocket.—*The American Art Printer.*

The Retouching Point.—To obtain a good point on the pencil has tried the patience of many a retoucher, and often caused much loss of temper. One of the best methods is, first, to roughly point the pencil with a sharp knife, then finish on a piece of ground glass. When extra fine work is wanted, two pieces of glass, with coarse and fine grain, will be found of service.

An Excellent Mountant.—With ordinary starch paste it often happens that prints loosen on the edges. A simple method to overcome this difficulty, and at the same time to increase the adhesive properties of the mountant, is to add while boiling a small quantity of Venetian turpentine.—*F. W. Geldmacher, in Liesegang's Almanac.*

Cleansing Bottles.—To remove the brown sediment in bottles containing hypo and alum solutions, pour a small quantity of sulphuric acid and a solution of bichromate of potash in the bottle. When the sediment is dissolved put in some water with sawdust or pieces of blotting paper, and shake up well.

Bird shot and water is also a good method of loosening this deposit.—*German Amateur Photographer.*

Silver Fluoride.—A solution of well-washed silver carbonate in hydrofluoric acid is evaporated to dryness, with constant stirring, in a platinum basin, and the resulting black pulverulent mass is dissolved in water and filtered. The clear filtrate, which, when left in contact with silver foil, yields crystalline silver subfluoride, is evaporated in the dark in a vacuum over sulphuric acid. As thus obtained, silver fluoride forms a yellow, transparent, tough, elastic mass, which is soluble in water, and melts at a dull red heat (the temperature as determined by Le Chatelier's thermo-electric method is 435°). Silver fluoride reacts violently with the chlorides of phosphorus, silicon, and boron, and with phosphorous oxychloride yielding the corresponding fluorine compounds of the non-metal and silver chloride.—*Journal of the Chemical Society.*

To Restore Old Photographs.—Put the card in warm water until the paper print may be removed from the card backing without injury. The prints can be restored by means of the following solutions: *a.* Sodium tungstate, 100 parts; water, 5,000 parts. *b.* Precipitated chalk, 4 parts; bleaching powder (chloride of lime), 1 part; sodium aurochloride, 4 parts; distilled water, 400 parts. Solution *b* is made in a well-corked yellow glass bottle, is allowed to stand twenty-four hours, and is then filtered into another yellow bottle. The faded prints are well washed, and placed in a mixture 1 to 2 parts of *b* and 40 parts of *a*. When the intensification is sufficient, the prints are immersed in a solution of 1 part of hypo in 10 parts of solution *a* until all yellowness has disappeared, and are then well washed.—*Scientific American.*

Fixing and Intensification Solution.—According to M. Milson-of Lyons, in the *Amateur Photographer*, weak and thin dry-plate nega, tives may be intensified in a fixing bath containing both hypo and ferrous sulphate, viz.:

A.—Hypo	1 part.
Water	3 parts.
B.—Sulphate of ammonium	1 part.
Water	5 parts.

The image becomes an intense black.

Colorless Varnish.—Colorless varnish, for use on fine labels or other prints, as well as for whitewood and other spotless articles, is made as follows: Dissolve two and one-half ounces of bleached shellac in one pint of rectified alcohol; to this add five ounces of animal bone-black, which should be first heated, and then boil the mixture for about five minutes. Filter a small quantity of this through filtering paper, and if not fully colorless add more boneblack and boil again. When this has been done, run the mixture through silk and through filtering paper. When cool it is ready for use. It should be applied with care and uniformity.

To Repair Papier Mache Accessories.—The professional photographer is often at a loss how to repair his accessories when they become broken or damaged. This is especially the case with photographers throughout the rural districts. For this purpose the following simple formula will be found valuable:

Take of good cabinet-makers' glue sixteen ounces, soak in water until soft, and then dissolve in water with heat until it becomes a thick fluid. Then take three sheets of strong white blotting paper and four sheets of white tissue paper, tear into small pieces, and stir into the glue with a wooden paddle until the pulp is mixed uniformly. When this has become a homogeneous mass, add, constantly stirring, eighty ounces of dry pulverized whiting, which is to be thoroughly incorporated with the pulp. After which

Linseed oil	2⅓ ounces
Venetian turpentine	1½ ounces

are added to the now plastic mass.

To prevent this stock pulp from fermenting, a small quantity of carbolic acid may be added.

Before using, the proper shade is given by kneading in dry color of the requisite shade. The application or modeling is done with a broad spatula.

Photographic Scissors and Paste.

"**I don't mind** doing away with the editorial 'we,'" said Editor Cutting, "but when a fellow comes into the office with a club and tries to abolish the editorial eye, it is a very different matter."—*Ex.*

Art in Blackville.—Photographer, focusing on a young American of African descent—"Now, Benjamin, stop grinning, and think of green persimmons, because if you smile we can't get the whole of you on the plate.

"**Paper, sir?**" asked the newsboy.

"No, I never read," was the blunt reply.

"Hi, boys, come here," called out the gamin; "here's a man as is practicin' for the jury!"—*Ex.*

Fickle William.—We learn by telegraph from Berlin that some uneasiness exists in that capital owing to demonstrations made by the photographers and artists in plaster-of-paris, who have been accustomed to reproduce likenesses and busts of His Imperial Majesty. They complain that, owing to a measure of uncertainty about the Emperor's personal appearance from day to day, they have large stocks thrown on their hands, and are reduced to a condition approaching bankruptcy. The crisis has been precipitated by the circumstance that, just when the combined trades, recovering from their first disaster, had produced a Christmas stock of portraits and busts, showing His Majesty with a beard, he shaved it off, and once more they have their goods returned on their hands.—*London Punch.*

The Indian *Daily News* says: "The Yankees have just found out that banana fibre will make printing paper of the finest quality at the cheapest rates. If this is true, we shall have paper down to a penny a pound before 1895. The supply of the new raw material will be inexhaustible, for the difficulty is to stop the banana plant growing in the countries where it is indigenous. English paper-makers will, of course, as usual, be the last to find out all about it." We do not know how this may be, but plantain fibre has for many years been known in Bengal, and the Bally Paper Mills have turned out some remarkably strong paper from it. The chief difficulty, we believe, is in cleaning the raw

material, and when this is successfully overcome by a process which will combine thoroughness with cheapness, the fibre will be very largely used. The supply would always be aLle to keep pace with the heaviest demand.—*Paper-Makers' Circular.*

A case has come before the courts of Berlin in which photography has once more proved itself to be a valuable ally of judicial investigation. A clerk in the employment of a certain banking firm was accused of having put into circulation a bill of exchange without affixing to it the stamp legally required. This, he declared before the court, that he had in due course done, but suggested that it had been subsequently removed. The bill in question was handed for examination to Dr. Bein, judicial chemist. On photographically enlarging the part to which it was alleged the stamp had been attached no trace of adhesive material could be discovered, and Dr. Bein demonstrated the validity of his negative by comparison with papers to which a stamp had been attached only for a moment, and in which traces of the adhesive material were plainly discernible.

Pigtail Photography.—The Treasury Department recently ordered that the photographs of all Chinamen arrested for unlawful entry into the United States from Canada be taken in order to establish a positive identification if they again return to this country. Lee Yick, Lee Lok, and Yan Bow were ordered back to Canada from Lockport, N. Y., by Commissioner Pound. There was a regular circus when their photo graphs were taken.

Lee Yick thought he was going to be executed when the photographer shot the camera at him, and he howled like a bull. Yan Bow had seen photography before, and he grinned all over, so it was impossible to get him in repose. Lee Lok was crafty and tried to hide his face. Copies of the photographs will be sent to each commissioner in this part of the country. There are over a hundred Chinamen in jail in New York State alone.

Flash-Light Work.—The unnatural expression frequently to be seen on the face of a person photographed with the aid of the flash-light has often been commented on. The painful look is similar to what might be expected if the sitter had just seen a ghost, and the picture was taken while the memory of the vision remained. This disagreeable quality in flash-light photographs is usually attributed to the shock that the sudden flash gives the sitter. It is to a totally different cause, however, that the expansion of the pupils of the eyes and

the accompanying weird glare are due. To take a flash-light picture the operator must darken the room, and while the room is darkened the pupils of the subject's eyes, in an effort to get what light there is, naturally expand. The picture is taken while they are in this state of unnatural expansion, with the consequence that in many flash-light negatives the sitter's eyes look like overcoat buttons. To further destroy the theory that the expression is due to the shock, it must be manifest that the picture is taken before the subject has time to change his expression.—*The Optician.*

A Young Lady's Experience in Photographic Art.—A young lady from Chester valley, an amateur photographer, was visiting in West Chester, Penna. The other day she grouped in pleasant attitude the family and friends with whom she is stopping in West Chester, and proceeded to photograph the same. Adjusting her hand-camera and locating at the proper focus the lenses, she "took" the group, and, transforming the party, she proceeded to give it another sitting. When the two negatives were taken she remarked in a tone of voice confident, as well as satisfied:

"There, that will do."

Proceeding to analyze the work she had accomplished, she discovered to her dismay that on both occasions she had the camera pointed the wrong way, and instead of the sober faces of her friends she had taken chickens, pigs, horse-tails, and a colored man who was looking over the back fence at the time. Her mortification and disappointment can better be imagined than described. But here we leave her, promising to forgive her, it being her first offence.

New Method of Producing Salted Paper with a Resinous Emulsion.—Salted paper, giving prints of from brownish to platinum-black tones, is prepared by E. Valenta in the following way: 10 grams of ammonium chloride are dissolved in 100 c.c. of water; on the other hand, from 3 to 4 grams of gelatine are allowed to swell in water, and, at the same time, from 3 to 4 grams of very finely powdered light yellow French colophony are saponified with ammonia. This is done best by bringing water in a porcelain dish up to the boiling point, adding to it a little ammonia, and stirring the colophony gradually into the liquid. The clear resin-soap solution is then mixed with the swelled gelatine, and after the latter has dissolved the ammonium chloride solution is added. Distilled or rain water is added up to 1000 c.c., and the solution carefully neutralized with diluted hydrochloric acid; and finally a concentrated solution of citric acid in water

is added until the solution shows a distinctly acid reaction. A milky solution is obtained in this manner, which is employed in the preparation of the paper. Rives' plain paper is recommended by the author for this purpose. It should be moistened by means of a sponge with the warm solution, and then floated for about three minutes upon the warm liquid. It is then hung up in a warm room to dry. To sensitize the paper, a ten or twelve per cent. solution of silver nitrate in water should be used, on which the paper is floated for two or three minutes. The paper is dried in a dark room, and may then be used for printing; but it will be better to fume it previous to printing, in the well-known manner for about ten minutes, since it will then print quicker and yield more brilliant prints. If the paper, after printing, is soaked for a short time in water, and then fixed in a ten per cent. solution of hypo which has been acidulated by means of sodium bisulphite, prints will be obtained of an agreeable reddish-brown. The image will not be sunk in, as in the case of the ordinary salted paper, but it will show brilliancy and clear whites.

To obtain black tones, the prints are at first placed in a bath of 0.3 grams of chloride of gold, 8 grams of borax, and 1,000 c.c. of water, and allowed to remain until they have acquired an intensely dark violet tone by transmitted light. They are then rinsed with water, and placed in a bath consisting of 1 gram of potassium chloroplatinite, 300 c.c. of water, and from 15 to 20 drops of nitric acid. In this bath they soon acquire a black color, which, after fixing, washing, and drying, renders them very similar to platinotypes. If the prints are fixed directly after toning, they obtain a very agreeable reddish-black color; if an acid bath of uranium nitrate is employed instead of the gold bath, the prints acquire a decided red-chalk tone. —*The Photographic News.*

"**Now**, isn't that a perfect picture of the baby?" asked Mrs. Noopop, displaying a new cabinet photograph.

"I don't think it is," said Noopop. "I don't hear a sound."

A man is like a postage stamp. When he is badly stuck on himself, as it were, he is not worth two cents for any practical use.

Our Illustration.—For the present month we present our patrons with a chromatic process reproduction of an instantaneous photograph, taken at night during the conflagration of the Luray Inn, November 5th, 1891. The negative is one of several made of the fire by S. K. Wright, photographer at Luray, Va. The exposure was made with a single achromatic lens, on a rapid portrait plate, a quarter-inch stop being used. The plates were developed with an ordinary pyro and soda developer. The night in question was very dark and misty, in fact, just the kind of a night when good results were least to be expected.

Mr. Wright certainly showed great enterprise in making the attempt to obtain views of the destruction of the celebrated hostelrie under such adverse conditions.

Our reproduction is from an ordinary half-tone plate etched on copper, printed with an additional color or tint block. The effect obtained well illustrates the possibilities of the use of color blocks in connection with the ordinary photo-engraving.

Novel Flash-Light Effects.—We are in receipt of prints from several negatives made with flash-light by E. M. Alden, Esq., Troy, N. Y.

Two of the pictures show a deer in his native haunts, as he is jumping through a swamp. These exposures were made from a boat, a novel application of flash-light photography never before attempted. This is the second season that Mr. Alden has attempted to photograph deer in their native haunts at night; the first season he met with no success. During the past season, out of seven attempts, he obtained the two negatives of which we have prints before us. In addition to the above, Mr. Alden has succeeded in obtaining an excellent negative representing night hunting in the Adirondacks, showing how deer are killed ahead of a light at night. This picture shows the hunters in their boat and a deer standing in the brush on the shore attracted by the light.

A New Enterprise.—We have received word that on January 1st, Mr. Henry Reichenbach, Dr. S. C. Passavourt and G. M. D. Milburn severed their connections with the Eastman Co., of Rochester, N. Y., and expect to engage in mauufacturing business on their own account. It is said that they have made and perfected what experts have pronounced as a very valuable invention in photography, which with some other photographic specialties, will be what they expect to manufacture for the trade. Announcement will be made through the AMERICAN JOURNAL OF PHOTOGRAPHY, at an early date.

THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.

A STATED meeting of the Society was held Wednesday evening, January 13th, 1892, Vice-President Joseph H. Burroughs in the chair.

The Board of Directors presented their monthly report, in which progress was reported in the work on the improvements in the meeting and work rooms, and it will be completed in time for the opening reception on January 21st. Attention was called to the Honor Picture Competitive Exhibition which would open on the evening of the reception, continuing until February 10th. On the evening of February 3d an illustrated lecture would be given by Dr. C. L. Mitchell on "Switzerland—The High Alps."

Mr. F. E. Ives exhibited one of his cameras for composite heliochromy. With a lantern objective having only one (large) aperture this camera produces three sharp images, exactly alike as to size and perspective and on one plane. Mr. Ives stated that such a camera would prove to be a practical necessity for composite heliochromy, and he regarded it as an optical triumph.

The subject announced for discussion, viz., "The Permanency of the Undeveloped Image on Dry Plates—What Conditions Influence It?" was next taken up.

Mr. Pancoast stated that some time ago he purchased three dozen plates of a well-known make. He used one dozen with excellent results at the time of purchase; the rest he laid aside, and did not use them until May, 1891, when he exposed four and found them all right. On May 16th he exposed six more on landscapes and interiors, giving rather full exposures. A week ago Mr. Pancoast commenced development. On placing a fully exposed landscape in pyro and potash developer no trace of image appeared. A second plate treated to a dilute alkali bath previous to the pyro, then subjected to a prolonged and forced development, produced no better result. A third plate, landscape, hydroquinone developer, still no result. A fourth plate was next tried in a mixed eikonogen and hydroquinone developer, and, strange to say, a very fair negative was the result. He then tried some of the unexposed plates on neighboring houses, producing good negatives.

Dr. Mitchell said it was generally recognized that eikonogen would bring out details that pyro would not. While he could not explain or give any good reason why Mr. Pancoast's plates did not come up properly, he thought there was no question that eikonogen would often bring out an image that pyro would utterly fail to produce at all.

Mr. Carbutt said that his experience had been quite contrary to

Mr. Pancoast's. He had made several hundred exposures in Europe in 1890, and they were not yet all developed. He had developed from time to time and had found no decrease in the image,—if anything, rather an increase.

Mr. Bell added his testimony in regard to the pyro and a mixed eikonogen and hydroquinone developer. Several times, in using pyro, he had failed to get any good results, but in changing immediately to the mixed developer he had obtained a beautiful image.

Mr. Bell asked Mr. Carbutt if he knew whether manufacturers to-day used any tannin at all in making the emulsion.

Mr. Carbutt could only answer for himself. He did not use any.

Mr. Chapman had been troubled with the film negatives darkening from the edge inward when kept several months after exposure, the trouble increasing with the length of time they were kept until, in some cases, it covered the film entirely.

Mr. Carbutt recommended packing in waxed paper as a preventive of fogging from the edges.

Mr. Brown favored the old-time method of packing plates tightly together with a piece of orange post-office paper between each pair. Plates packed in that way, very tightly wrapped together, he had kept for four or five years, and they were as good at the end of that time as when he bought them. The present method of separating plates permits the circulation of air between them, carrying with it gases and impurities which would tend to injure the plates and bring about the blackened edges spoken of by Mr. Chapman, extending finally to the centre of the plate. Some time ago he placed some plates that were working admirably into his plate-holders, where they remained over two months. When exposed and developed he found this blackening upon the edges. Curiosity prompted the trial of some of the plates he had kept in a tin box in the same paper packages in which they had been received. Result: no blackening. In the former case the plates in the holders were exposed to the air, whereas those in the paper box enclosed in a tin box were kept from contact with the air; none could get in. He would suggest that the makers pack their plates closely together, rather than separate them, as was now done. In his experience those packed tightly did no rub or scratch.

Mr. Wood referred to the plates mentioned by him at the last meeting which had been three weeks in the hypo without changing, and suggested that plates developed with eikonogen, above a certain temperature, so tanned the film, that it prevented its clearing at all.

Several lantern slides, made with the new para-amido-phenol developer, were next exhibited by Dr Mitchell, after which the meeting adjourned.

ROBERT S. REDFIELD, *Secretary.*

In the Twilight Hour.

CHAIN anger, lest it chain thee.

CHILDREN are poor men's riches.

BAD beginnings have bad endings.

SPEECH is silvern, silence is golden.

DO good if you expect to receive it.

FORE-CAST is better than work-hard.

UNLESS we do what is useful, vain is our glory.

GRATITUDE preserves old friendship and procures new.

HE that defends an injury is next to him that commits it.

THROW no stones into the well whence you have drunk.

HEALTH and understanding are the two great blessings of life.

A LAUGH costs too much if it is bought at the expense of propriety.

HE is not a virtuous man that loveth not virtue even in an enemy.

LABOR rids us of three great evils,—irksomeness, vice, and poverty.

HE surely is in want of another's patience who has none of his own.

IT is a sin against hospitality to open your doors and shut up your countenance.

EMPLOY the hours of sunshine, for "when the night cometh no man can work."

TWO things indicate an obscure understanding: to be silent when we ought to converse, and to speak when we should be silent.

THE desire of knowledge, like the thirst of riches, increases ever with the acquisition of it.

TAKE care to be an economist in prosperity; there is no fear of your being one in adversity.

HE who is most slow in making a promise is apt to be the most faithful in the performance of it.

THE tallest trees are most in the power of the wind, and ambitious men of the blasts of fortune.

FOR want of a nail, the shoe is lost; for want of a shoe, the horse is lost; for want of a horse, the man is lost.

IF you stand in need of physicians, let these three things be your physicians: a cheerful mind, relaxation from business, and a moderate diet.

"THE gain of lying," said the great Sir Walter Raleigh, "is nothing else but not to be trusted of any, nor to be believed when we say the truth."

TRUE happiness is of a retired nature, and an enemy of pomp and noise. It arises, in the first place, from the enjoyment of one's self, and, in the next, from the friendship and conversation of a few select friends.

HE that never changed any of his opinions never corrected any of his mistakes; and he who was never wise enough to find out any mistakes in himself will not be charitable enough to excuse what he reckons mistakes in others.

IRREGULARITY and want of method are only supportable in men of great learning or genius, who are often too full to be exact, and therefore choose to throw down their pearls in heaps before the reader rather than be at the pains of stringing them.

Literary and Business Notes.

THE Christmas number of the *Photographic Times*, as usual, comes in the shape of a double number with four full-page illustrations and illuminated capitals. A novel feature is the portrait and autograph of the different writers at the end of their papers.

RECEIVED from Gauthier-Villars, Paris, "Manuel de Ferrotype," by Henry Gauthier-Villars. It consists of thirty-six pages, divided into six chapters, embracing the various manipulations involved in the production of ferrotypes, the closing chapter dealing with their applications.

THE first of the mechanical-process catalogues to reach us in the new year is one from the Philadelphia Photo-Electrotype Co. It contains a number of specimens of half-tone illustrations from photographs, wash drawings, paintings, etc., all etched on copper, and well illustrates the great strides made in this branch of photomechanical processes within the last few years.

THE *Philadelphia Record* almanac for 1892 is received. As usual it is full of useful and local matter, even surpassing its predecessors in the amount of information contained between its covers. A unique feature of the almanac is a series of sixteen illustrations of Old Philadelphia, as it appeared a century ago. The plates are half-tone reproductions from originals in possession of Mr. Julius F. Sachse, the editor of the AMERICAN JOURNAL OF PHOTOGRAPHY.

THE *Scientific American*, published by the patent agency firm of Munn & Co., New York, is the most practically useful publication of its kind in the country. Indeed, t occupies a field distinctively it own. Not alone for the machinist, manufacturer, or scientist, but it is a journal for popular perusal and study. It is the standard authority on scientific and mechanical subjects. It is placed at a very low rate of subscription, $3 per annum, which places it within the reach of all. Subscriptions will be received at the office of this journal.

PHOTOGRAPHY APPLIED TO THE MICROSCOPE. Anthony's Photo. Series, No. 36. By F. W. Mills, with an appendix on Mounting Objects by T. Charters White, M.R.C.S., F.R.M.S., illustrated with half-tone plates and wood-cuts. This booklet of 62 pages is handsomely gotten up, and published simultaneously in London, Melbourne, and New York. A practical guide for the application of photography to microscopy has been a long-felt want; this booklet fills this demand. All the different processes from the preparation of the microscopical object to the final printing are set forth in a concise and practical form.

A UNIQUE MAGAZINE.—A unique experiment will be tried in the February issue of the *Ladies' Home Journal*. The entire number has been contributed in prose, fiction, and verse by the daughters of famous parentage, as a proof that genius is often hereditary. The work of thirty of these "daughters" will be represented. These will comprise the daughters of Thackeray, Hawthorne, Dickens, James Fenimore Cooper, Horace Greeley, Mr. Gladstone, President Harrison, William Dean Howells, Senator Ingalls, Dean Bradley of Westminster, Julia Ward Howe, General Sherman, Jefferson Davis, and nearly a score of others. Each article, poem, or story printed in this number has been especially written for it, and the whole promises to be a successful result of an idea never before attempted in a magazine.

RECENT PATENTS.

THE following list of patents relating to the photographic interests is specially reported by Franklin H. Hough, solicitor of American and foreign patents, No. 923 F Street, Northwest, Washington, D. C.

ISSUE OF DECEMBER 1ST, 1891.

464,462—Photographic Cameras, Lens Supporter for; C. Mills, assignor to E. & H. T. Anthony & Company, New York.

494,260—Photographic Camera Shutter; A. G. Tisdell, Brooklyn, N. Y.

ISSUE OF DECEMBER 8TH, 1891.

No issues.

ISSUE OF DECEMBER 15TH, 1891.

464,998—Photographic Apparatus, Shutter for; W. E. Schneider, assignor to M. Earle, trustee, Philadelphia, Pa.

465,277—Photographic Printing Frame; H. Kuhm, Springfield, Mo.

465,178—Photographic Process for Printing in Colors; J. C. Hosch, Vienna, Austria-Hungary.

464,999—Tripod; W. E. Schneider, assignor to M. Earle, trustee, Philadelphia, Pa.

ISSUE OF DECEMBER 22D, 1891.

465,740—Photographic Machine, Coin Operated; C. B. Booth, Camden, N. J.

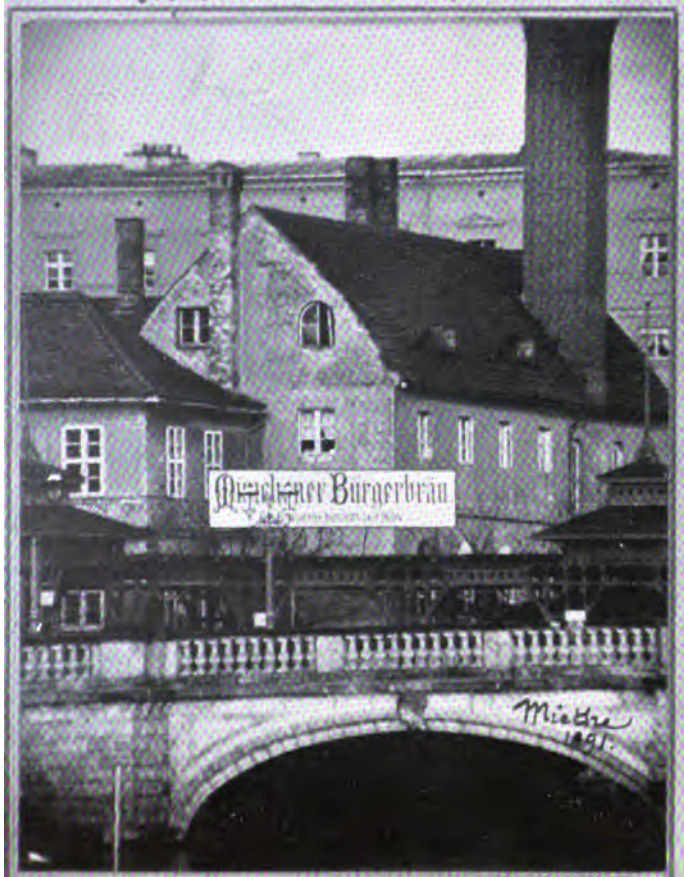
ISSUE OF DECEMBER 29TH, 1891.

466,000—Photographic Printing Frame; A. Barker, Peekskill, N. Y.

Photographischer Almanach und Kalender for the year 1892, published by Ed. Liesegang, Germany.

This annual, in contrast to the English and American annuals, is a small and handy volume of 176 pages, and contains as much if not more information than its more bulky competitors. The frontispiece is a portrait of Ottmar Anschütz, well known from his photographic studies in scientific photography. The almanac is fully up to its predecessors of former years, and forms a ready volume of reference for the German amateur and professional.

From the same standpoint



taken from a distance of 350 m. with Dr Miethe's new telephotographic lens. Camera length: 38 cm.
Expos. 0,5 sec

From the same standpoint

taken from a distance of 350 m. with an ordinary Dr Miethe's symmetrical lens. smallest stop, Expos. 1,5 sec.

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PHOTOGRAPHY

THOS. H. McCOLLIN, Managing Editor.
JULIUS F. SACHSE, Editor XANTHUS SMITH, Associate Editor.

Vol. XIII. MARCH, 1892 No. 147.

THE WILLIS PATENT UPON THE PLATINUM PROCESS.

IN our October JOURNAL of last year we published a written opinion upon "the expiration of the patent on the Willis Platinum Process" by Hector T. Fenton, Esq., of Philadelphia, the eminent counsel being one of the well known lawyers connected with the patent bar in the United States.

This announcement, coming from so eminent an authority, naturally caused a considerable commotion among the photographic press and guild at home and abroad.

We have received a number of communications in relation to this subject, among which is the following from the Platinotype Company of this city: viz.:

To the Editor of THE AMERICAN JOURNAL OF PHOTOGRAPHY

DEAR SIR:—My attention has been called to a recent article in the AMERICAN JOURNAL OF PHOTOGRAPHY, wherein it is suggested that the term of the Platinotype patents had expired.

The article is misleading, and with your permission I would be glad to state the following, for the benefit of anyone who may have been misled by the article in question:

The first patent recorded in the United States for a process of producing pictures in the metal platinum, was granted Willis in 1876. This process, as everyone familiar with it knows, was a very complex

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affair, necessitating the use of silver, gold, and hypo before the picture was considered finished. Many beautiful results were got by this process, but the working was not always attended with success. It was a beginning of "The Platinotype."

The patent which followed (1879) was a great advance, but as neither of the three principal salts—ferric oxalate, oxalate potash, potassic chloro-platinite—used in or about the process were in the market, it was a tremendous labor to discover the best method of manufacturing these salts. Moreover, we soon found that none of the photographic papers in the market could be used for Platinotype, and a paper had to be invented for our use.

Our last patent was granted in *March, 1890.* This patent fully covers the application of a solution of ferric oxalate or its compounds to paper or other surfaces, exposing this prepared paper to the action of light, and developing the exposed image to a metallic platinum picture. I have no knowledge of any patented process or processes for prints in platinum other than those of Willis.

The method as published by Pizzighelli was discovered by Willis fully fourteen years ago, and laid aside as being imperfect. A "Printing Out" process in platinum had long been in the mind of Willis, and hundreds of experiments have been made by him in that direction; but the many difficulties in the way will make it almost impossible to ever get a perfect process of this kind.

Our patents are original. There are no similar patents in any country in the world. It would, therefore, be not difficult to establish our claims.

Respectfully,

ALFRED CLEMENTS.

In view of the great importance of our announcement in October last that the original patents on the platinum process had expired, and its bearing upon photography in both Europe and America, our English contemporary, *Photography*, November 12th, 1891, inserted the following query:

"According to the AMERICAN JOURNAL OF PHOTOGRAPHY, Willis's patent on the Platinotype process has expired. We cannot say whether the statement is correct or otherwise. Perhaps the Company will enlighten us."

This elicited the following intemperate and vague reply from one Ernest J. Humphrey, who is presumably connected or employed with the Platinum Syndicate in London.

THE PLATINOTYPE PATENTS

In your last number of *Photography* you ask us to state whether there is any truth in an announcement in some American paper that our patents have expired by lapse of time. I need hardly say that it is absolutely untrue. We should not have taken notice of such a palpably false statement if you had not asked us to contradict it. (Signed) ERNEST J. HUMPHREY.—*Photography, November 19th, 1891.*

It will be noticed that both of the above disclaimers make no mention of any particular patent, but directly avoid the point at issue, viz.: the original patent of the process. Where allusion is made to two subsequent patents, it will be well to bear in mind that these are in no manner alluded to in Mr. Hector T. Fenton's opinion as published by us in October last. This opinion is founded solely upon the expiration of the first American patent of 1876—No. 173,381,—which in turn has its basis upon the British patent No. 2,011, dated December 2d, 1873. It is this patent and no other which is quoted, and which indisputably and without a shadow of doubt forms the foundation of the whole process.

Another thing, the fact that any portions of the process are withheld from the licensees, such as the manufacture of the chemicals, etc., according to an eminent English authority[1] in itself would seem to invalidate the patent, viz.: "To support a patent, it is necessary that the specification should make a full disclosure to the public. If the patentee suppresses anything, or if he misleads, or does not communicate all he knows, his specification is bad. It must be so full and distinct as to enable any person completely acquainted with the subject of the invention to perform the patented process without the necessity of performing experiments for himself."

The above letter from the Platinotype Company in Philadelphia, as well as the vague and choleric statement which appeared in *Photography* of November 18th, 1891, were both reprinted in the *Beacon* for December last, a copy of which was brought to

[1] S. J. Debenham, *Photographic News* Almanac, 1889, p. 95.

the notice of the eminent counsel who had written the opinion in question. In reply we have received the following specific and conclusive answer, which we reproduce in fac-simile.

Telephone [illegible]

Law Offices
Hector T. Fenton
No. 903 Walnut Street

Patent Courses

Philadelphia Jan. 15, 1892.

To the Editor of
The American Journal of Photography.

Dear Sir:-

My attention has been called to an article signed by Ernest J. Humphrey in the Beacon of Photography of December 1891, and I have also read the letter addressed to you dated December 9, 1891, and signed by Alfred Clements. In that letter he refers to three patents. I know nothing of the last two mentioned. The first he refers to, as granted to Willis in 1876, for a process of producing pictures in the metal platinum, is no doubt the same patent referred to in my opinion of June 16, 1891, published in your Journal for October 1891. That U.S. Patent is No. 173381 and is dated February 8, 1876. It was granted to William Willis, Birmingham, England and is for a process entitled Improvement in Photo-chemical printing. The contract of license referred to in my letter of June 16, 1891, is a printed form of license used by Willis & Clements and refers to a single patent, namely, the above patent No. 173381. Before writing the opinion dated June 16, 1891, I carefully compared that American patent No. 173381 with a prior English patent to Willis No. 2011 dated December 2, 1873, and they are identical both in description and claim. Under our American law by force of Revised Statutes, section 4887, it is provided that "every patent granted for an invention which has been previously patented in a foreign country, shall be so limited as to expire at the same time with the foreign patent, or if there be more than one, at the same with the one having the shortest term." It will thus be apparent to you that the American patent, though dated in 1876, is limited in term to expire with the prior English patent dated December 2, 1873, and hence had expired when I wrote the opinion above referred to. The most recent decisions of the Supreme Court of the United States explaining and applying this section of the Revised Statutes will be found in the case of Pohl vs Anchor Brewing Co., 134 U.S. Reports, page 381, decided March 24, 1890; and Commercial Manfg. Co. vs Fairbanks Canning Co., 135 U.S. Reports, page 176, decided April 21, 1890.

Yours respectfully,

[illegible]

THE WET COLLODION PROCESS.—I.

BY ELLERSLIE WALLACE.

IT is by no means our purpose to consume space in detailing the merits of our modern photographic processes. Everybody is aware of them, and of the great advances that have been made in the past decade. But we wish to ask whether it is true wisdom to entirely neglect all the older processes? New things are good and interesting; but is this tantamount to saying that old things are obsolete and bad?

We know that there are many members of the craft who say that the wet collodion process is obsolete and has been so for a long time. We dissent from such an opinion; in fact, we have always maintained that every well-informed photographer should understand the collodion process. And in the course of some recent conversations with a number of our leading operators we were gratified to find our ideas thoroughly supported.

What are the reasons for such an assertion? In the first place, the results produced by wet collodion are more directly under the operator's own control than is the case when commercially prepared plates and sensitive tissues are used. There is decidedly greater latitude in the handling of wet collodion than there is with dry plates. As is well known, the collodion plate must be developed within the shortest possible time after being prepared. This makes it easy to detect any errors in timing or development, and supposing such to have occurred, a fresh negative may be completed in a very few moments, and with a minimum expenditure of labor and material. It is not going too far to say that in the time that would be occupied in intensifying, reducing, or otherwise "doctoring" a dry plate negative that was just a little short of the perfection desired, a new negative could be made on wet collodion and not stand in need of any "helping" of the kind.

To enlarge upon this a little, we may say that there is hardly a number of any respectable photographic journal issued that does

not contain formulæ for intensification or reduction or both. Why is this? Are negatives so often overtimed or over-developed that they have to be "cut down" with powerful chemical agents? Or, on the other hand, are they so thin that they constantly require "building up"? Not in experienced hands, of course, or when all the conditions happen to be favorable; but in very many cases these after-treatments are indispensable to the securing of even a passable, let alone a first-class, result. With wet collodion these intensifyings and reducings are seldom required, and skilful operators used to consider it a point of honor to hit the timing exactly upon the first trial, and make the development so suit the timing and the collodion as to give a perfect negative ready for the fixing.

Again, the study of wet collodion is a grand educator of the eye for photographic gradation of tone. A man who has been trained to critically examine collodion work will be quick to detect slight fogging, flatness, and solarization, that would escape the notice of one who had never seen anything else than gelatine work. The majority of good collodion negatives, if compared with gelatine ones, show cleaner-cut outlines. The deposit that forms the image is strictly limited to those portions of the film upon which the light has acted, while the gelatine plate shows almost universal encroachment of the light upon those portions which ought to remain clear and free from deposit. This over-action or blurring often produces very artistic and pretty effects, but it is a photographic defect, nevertheless.

Besides all this, there are some kinds of work that can best be done with wet collodion; or, in other words, the labor of obtaining an equally good result with gelatine would be so great as to make its use impracticable. One of these is the making of lantern slides, and another is the copying of drawings, plans, maps, printed matter, music, and the like. We have frequently adverted to the subject of collodion lantern slides in these columns. As regards copying, particularly that more delicate kind required in "line-work," as it is called, the blurring of the image spoken of above would be fatal. Even with the clean working of the collodion process, special means are resorted to to produce an image with

perfectly transparent lines relieved against a dense non-actinic background.

Last and not least of the points in favor of wet collodion is the cheapness both of the material and of the working of the process.

Our younger operators, who are trained to the usual modern standard, may fancy that it would be time wasted to acquaint themselves with a process like wet collodion. "Let the older hands look out for this; have we not enough to do in learning all that we have to learn? The old fellows know it all already, and if they have to use it, why let them use it, and not bother us with such played-out old stuff."

Now to any of our young men reasoning in this shallow manner, we say that a photographer's assistant knowing wet collodion well enough to relieve his employer, say of a long job of lantern-slide making from the negatives of some amateur, is a far more valuable man than one who does not. Such work when once understood is quite easy, and the profits are good. Moreover, the work is of a routine character, and the employer's time can be spent to far better advantage in other ways, if only he has an assistant upon whom he can depend to do the routine paying work properly. Let us now give some plain directions for working wet collodion.

A wet collodion plate is prepared entirely by the operator himself. The first point to be attended to is the selection of the glass. Any reliable stock dealer will furnish this article cut to the desired size. It is a safe thing, though, to be sure that the glass is correctly cut to fit the plate-holder before proceeding to clean it. This being settled, the sharp edges should be removed by drawing the plates across each other at an angle, one being held in each hand. The hands should be protected with an old pair of thread gloves, which also keep the natural grease of the skin from soiling the glass. The edges being thus removed, the corners should be seen to, and if they are sharp they may be removed by a touch or two upon a soft scythe-stone. Glass that has been used before must be soaked for some hours in a strong solution of washing soda or concentrated lye, until the films are

quite rotted, and curl off of themselves; they are then taken out, washed off under a stream of water, and set in a rack to drain. The glasses should never be laid on top of one another in a pile.

A suitable vessel must be provided in which to keep the mixture of nitric acid and water (one part to three) for the cleaning. A stone-ware pan not less than four inches deep is the best, and a stout piece of common glass should be fitted to it as a cover to prevent the fumes of the acid from escaping. This pan should be kept out-of-doors near the hydrant, except in very cold weather, when the liquid would freeze.

If the glass is new, twenty-four hours' soaking in the acid will be enough. If it has been used before and the films removed by alkalies, a little longer will do no harm, though not perhaps actually necessary.

Glass should always be cleaned in rather large quantities at once. It is as much trouble to get things ready for a dozen plates as for a gross. A room must be devoted to the coating and drying of the plates, and no dust raised during the drying.

The albumen substratum with which the plates are coated is thus prepared: To twenty ounces of clean, soft water, add the white of a fresh egg, and stir for a few minutes until the albumen is dissolved. It is best to do this in a clean pitcher kept for the purpose. It is then allowed to stand for half an hour until the whits flocks settle to the bottom. If poured out on the filter they would choke it and create unnecessary trouble. The solution is then filtered into a clean, lipped graduate or beaker-glass through a single fold of gray filtering paper, taking care not to let bubbles form nor the white flocks from the bottom get out. The glass funnel should be lowered into the beaker until its end nearly touches the bottom. The albumen will then descend quietly and quickly. The receiving vessel should not be more than half filled; let another be in readiness to take the remainder. If a row of minute bubbles forms on the top of the liquid, they are best removed by dipping in the tip of the finger. Whatever of the liquid is left over after the glass is all coated must be thrown away, and all the beakers and funnels well washed out before inverting them upon a clean shelf to dry.

The water, as we have already said, must be *clean* and *soft*. It would be very risky to coat glasses when the supply from the city mains is full of the filth washed down by heavy rains or freshets; and, on the other hand, if the water is hard and full of lime, distilled water or clean melted ice must be substituted. In such a case it would be proper to wash the acid off with the hard water, but the plates should be rinsed with the melted ice before applying the substratum.

The albumen is applied to one side of the glass only. Both slides, however, must be rubbed while under the tap, with a ball of absorbent cotton or a clean piece of india-rubber sponge, to remove deposits. Each glass is held in the hand a moment to drain, during which time it is closely examined; then the albumen is gently poured on at at upper corner, circled over the surface of the plate, and thrown off to waste from the lower corner. The plate is then immediately set in a clean rack to dry, which it will do in less than half an hour. After seeing that the lowest corners are quite hard, the glasses may either be put away in grooved boxes, or stood together face to back on a shelf. A piece of paper is pinned over to exclude dust.

Flexible Glass.—An important discovery.—Herr Eckstein, an Austrian engineer, claims to have discovered a strong and flexible substance, as transparent as the ordinary brittle glass. His process is as follows: From 4 to 8 parts collodion wool are dissolved in about 1 per cent. in weight of ether or alcohol. This solution is intimately mixed with from 2 per cent. to 4 per cent. of castor oil or other non-resinous oil, and from 4 per cent. to 10 per cent. of resin or Canada balsam. This mixture is spread on a glass plate and dried under the influence of a current of hot air of about 50° C., by which it is transformed in a comparatively short space of time into a transparent, hard vitreous plate, the thickness of which can be regulated as desired. The material thus obtained is said to resist the action of salts, alkalies, and acids, and besides being transparent is odorless. It is flexible, and almost unbreakable. Its inflammability is much inferior to that of other collodion combinations, and it can be further reduced by the addition of magnesium chloride, while an admixture of zinc white produces an ivory appearance. Any color or shade may be imparted to the new glass.

WHY ARE PLANTS GREEN?

BY R. ED. LIESEGANG.[1]

(Translated from the German for AMERICAN JOURNAL OF PHOTOGRAPHY, by J. F. Sachse.)

THE usual answer is: That foliage contains chlorophyll, whose chemical and molecular properties cause the absorption of some, and reflection of other solar rays,—thus resulting in green.

Since the days of Darwin, scientists have sought for the object of the special colorings of the various organisms.

Many animals carry the color of their natural surroundings,—the pursued animal, the same as the pursuing hunter, who dons a green costume, endeavors to make itself unnoticeable (pro- and anti-cryptic coloring—mimicry).

Colors in strong contrast to the surroundings are found to serve as a warning or signal (sematic coloring); therefore the attractive colorings of flowers which have to be impregnated by the aid of insects.

The green hue of our foliage results from none of these conditions, but from necessity, as the conditions for their existence were different.

By the application of Hackel's fundamental biogenetic laws to plant life, we find in the ontogenesis,[2] a *recapitulation* of the phylogenesis.[3] This, however, is only of interest to students of phytotomie.[4] We *do not* learn thereby wherefore certain organisms modified themselves in any certain direction.

The peculiar forms arising during the ontogenesis are not caused by exterior conditions, as would be the case in the phylogenesis.

[1] *Photographisches Archiv*, No. 677, pp. 269, *et seq.*

[2] In biology, the history of the individual development of an organized being.

[3] That branch of biology which attempts to deduce the ancestral history of a plant from its ontogeny, or *individual* developmental metamorphosis.

[4] The dissection of plants.

To comprehend the necessity for each individual phase of the latter, we must seek the acting exterior forces. The existent conditions of plant life were not always the same as at present. The Eocene[5] period of our planet, at the period when the first organisms, the primary germ came upon the earth, formed itself or was created, the specific warmth was much greater than now.

Even as late as the Eocene period we have to assume a tropical climate for our zone, which gave entirely different meterological conditions. The air was denser, the carbonic acid gas and aqueous vapor in the atmosphere was far greater, thus causing a much greater absorption of the solar rays. With our present atmospheric conditions the short-waved rays are absorbed most, —red the least. According to Langley the ratio is:

Ultra-Violet.	Violet.	Blue.	Green-Blue.	Yellow.	Red.
39	42	48	54	63	70 per cent.

During sunrise and sunset, when the light has to pass through a greater stretch of space, we notice that the red rays always predominate.

If the air is strongly charged with aqueous vapor (fog) we only see red light. This justifies the conclusion that in the primary period only the red rays reached the earth's surface, consequently the primary organisms were forced to draw their sustenance from the inorganic. This in contrast to the animal creation where, to insure the assimilation of the requisite energy-matter, it was necessary to be separate from the latter.

The only energy which could continually influence the organisms lacking locomotivity, were the solar rays, and from these the red alone reached them.

The law of functional adaptation, promulgated by Lamarck, and elaborated by V. Roux, prove that these primary cells or groups absorbed these rays, and thus applied them to their sustenance.

These organisms, which from now on we will designate plants, gradually assumed the complementary color of the absorbed rays of the acting light, and thus became green. Lack of application

[5] Literally, of the dawn of the recent, applied in geology to one of the divisions of the Tertiary, as originally suggested by Lyell.

prevented a darkening, and operated against any formation of different pigments. The chlorophyll formation did not then exist even in embryo, and arises now only through the tropical action of the light.

Analogous conclusions drawn from the ontogenesis, show that the bright green of this primary period, which was similar to the bright color of our spring foliage, gradually became darker, or more blue-green. Consequently the most active end of the spectrum was then as different in its various phases as now. This is the cause why many statements made since Priestley fail to harmonize,—they vacillate between red and yellow.

Gradually important atmospheric changes took place, and up to the glacial period the air became less damp and warm, then almost all the solar rays reached the earth's surface. At the same time the carbonic acid gas was also greatly reduced by the action of the plant life. The carbon was deposited upon the surface. This was the reason plant organisms did not assume the dark shades, which under present conditions are apparently so advantageous.

The quantity of carbonic acid gas which then within a certain time came in contact with the leaf surface contained only the absorbing energy necessary for the reduction of the green and blue-green rays. As shown by Timiriazeff, of the twenty to twenty-five per cent. of the total rays which are absorbed, not over five per cent. are transformed into chemical action.

Without doubt, a better condition for plant life developed gradually. The proportion of carbonic acid gas in the atmosphere increased, perhaps by the oxidation of the carbon previously deposited.

The maximum of decomposition, which is at present reached by removing one-half of the direct insolation (Timiriazeff), becomes slower only with complete insolation, and then the foliage becomes darker.

The excessive absorption matter, for plants in undiluted light, becomes requisite in their youth if growing up in the shade of older or larger plants.

In this condition such species flourish which can best absorb the sparse rays. This explains Von Steenstrup's deductions from examinations of the turf moors of Denmark, that in the formation of the forests after the Arctic flora first came the ash, then the pine, oak, alder, beech, etc. Nathorst found a similar condition in the calcareous turf deposits.

The coloring of the foliage shows, independent of less important facts, according to Heyer, the growing demand for light of the ash, birch, pine, and oak, and thereby explain the increasing power of resistance of the ash, birch, pine, oak, and beech in the struggle for existence as indicated by Hansen.

According to the authorities above quoted, it would be an error to judge the differently-colored aquatic flora from the conditions of the land flora.

The density of flowing water for the various rays is entirely different from a foggy atmosphere. Measurements by Hüfner and Albrecht prove that the long light waves are more readily absorbed than the short-waved rays. Therefore, according to the laws of fundamental adaptation, one or more coloring matters are apt to combine with the chlorophyll, which stimulate an absorption of the strongest rays which the water allows to pass through.

In this manner arose the golden yellow Phycoxanthin of the Diatomen, which subsequently changed from olive-green to brown.

With most of the olive-green *Ledertangen* a third pigment forms, viz., the intense red Phycophäin.

The most strongly marked instance of this transposition of the power of absorption is seen in the red Floridees, which contain the red Phycoerythrin.

All pure green colored algæ are seen only in very shallow waters. The olive-green are found usually on the edge of the highest flood or lowest ebb-tide. The red are indigenous to the deepest waters.

The latest investigations show that bacteria are spheroidal, rod-like, or spiral. Under the most powerful microscopes they are found to have a granular mass in the centre, surrounded by a thin, structureless membrane.

THE USE OF LENSES.

BY XANTHUS SMITH.

AS we constantly find in our intercourse with amateurs that there is a great lack of a proper understanding of the purposes and uses of lenses with those not considerably practiced in the art of photography, and a corresponding desire for information, we feel that it might not come amiss to offer some hints about their practical uses.

The largest number that has to be considered in offering advice, are those who wish to accomplish the most that may be done with the least outlay, and for such we would unhesitatingly say that there is nothing so generally useful as a good five by eight rapid rectilinear lens of about eight inches back focus—supposing the use of a five by seven camera. Such a lens will answer perfectly for landscape work, groups, or copying, and will be found excellent for taking portraits, provided it be not strained to too large a size of head, not more than two inches being the limit of size which should be attempted with such a lens.

While, however, the five by eight rapid rectilinear lens as above spoken of will accomplish good work in a large number of cases, it is not to be supposed that the best work in each of the principal walks of photography is to be attained in any other way than by the employment of lenses adapted to the subjects to be photographed. Supposing the use of a camera, or rather of plates, of one size only, it will be found necessary to have in constant use three lenses, one of short, one of medium, and one of long focus. The reason of this is, that in pursuing the art of photography we are continually hampered in the matter of the point of view. If one could invariably interpose a sufficiently clear and uninterrupted space between the camera and the subject to be photographed, to enable him to remove to a distance, say, sufficient to make the boundaries of the picture conform to a five by seven plate with a nine-inch focus lens upon the camera, we would be making the best landscapes and architectural views,

artistically speaking. Unfortunately, in actual practice this cannot be done, becanse in attempting architectural subjects it is only on very rare occasions that a building can be photographed at a distance sufficient to make its perspective conform to what would be considered agreeable in a drawing, and in the case of apartments also, as one is invariably confined within them by the walls which form their boundaries, or very nearly so, sometimes being able to gain a slight remove of the camera through one of the apertures, we can never count upon freedom in position for the point of view. We must, therefore, in order to accomplish architectural work at all, either exterior or interior, be provided with a short-focus (wide angle) lens, and further, we must here refer to the wide-angle lens as sometimes being invaluable for copying large objects, as maps, etc., in confined apartments.

In landscape viewing, where one has really the greatest scope in the matter of selection of point of view, if we wish to secure all the beauties that nature offers in the way of pictures we must provide ourselves with at least two, and, better still, three lenses, because the confined wood scene, the rocky glen and picturesque roadside bit only are to be got with the short-focus lens suited to the architectural work; the distant range, or fine middle distance group, with a long-focus lens; and the complete landscape view, embodying distance, middle distance, and foreground, with the lens of medium focal length.

Portrait work, for those unprovided with a regular portrait lens, should only be attempted with a lens of great focal length; not only because in attempting to proportion the head to the plate with a short focus lens the distortion would be immense and ruinous for good work, but also because much softer, better texture of flesh will be attained with the long- than with the short-focus lens.

It is a matter upon which amateurs generally may congratulate themselves, that very fine portrait work may now be done with a good rapid rectilinear lens of long focus, the rapid plates at our command making the large opening of the portrait combination less a necessity than it used to be. The same, namely, the rapid rectilinear of long focus, will also be found the best adapted for

taking figure groups, and will be the one spoken of as required for extended landscape work. Such a lens will also be found invaluable in making copies of paintings, or objects with large, flat, glossy surfaces that must be kept at a considerable distance from the camera to avoid getting the glare next the source of light.

We are confining ourself in these remarks to a supposed use of what are commonly called doublets, in contradistinction to single lenses, because while a very few things may be done, and well done, with a single lens—(we include the achromatic),—its field of usefulness is confined almost solely to landscape viewing, for owing to its lack of power to represent right lines correctly it must be absolutely counted out for architectural work and copying; and from the necessity of cutting off the admission of light by small stops in order to attain flatness of field and definition in the photograph, it is comparatively useless for securing pictures where rapidity of exposure is a necessity. Single lenses still have, no doubt, in a few instances their advocates, but one can say that when occasion may arise, in taking some landscape view, wherein it would be well to use a single lens, the possessor of a good doublet has always the resource of removing the front lens of his combination and using the back one solely. In cases where a much longer focus lens is required than the combination, this mode of using one portion of it will sometimes be found very serviceable.

In speaking of the focal length of a lens the standard for ordinary practical purposes should be governed in a general way by the longest way of the plate used, that is to say, a lens of about eight inches focal length will accomplish the greatest variety of work on a plate of not more than eight inches in its greatest length. When we use a lens of four or five inches focal length on such a plate we are using a short-focus or wide-angle lens, and in the use of a twelve-inch lens on the same plate we are using a long-focus lens.

It is not always necessary to possess a wide-angle lens in order to do close-at-hand work. A rapid rectilinear lens of five or six inches focal length, if it be a superior, one will make excellent

IN THE LAND OF THE MIDNIGHT SUN,
THE OLD CHURCH AT BORGUND, NORWAY.

NEGATIVE BY
C. L. MITCHELL, M. D.

ENGRAVED BY THE
PHILADELPHIA PHOTO-ELECTRO CO., [illegible]

work on a seven- or eight-inch plate [illegible]
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We would advise always using [illegible] that [illegible]
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the distortion is less apparent than where there are figures present which at once furnish the eye with a definite source of measurement, and than architectural pictures, in which the [illegible] converging of the right lines of buildings, if too highly distorted, gives the structure the appearance of being out of square—the receding walls looking as if they formed less than a right angle. [illegible] persons will contend that there is nothing objectionable in this distortion, that the perspective of the scene is perfectly correct and that in order to prove it you have only to hold the finished print within a very short distance from the eye while [illegible] at it and it will appear perfectly true, all of which is true [illegible] but what comfort have we in looking at a point so close t[illegible] as to strain it, or in looking at a noble or picturesque t[illegible] when so close to it that we may touch it with our nose? [illegible] indeed we wish to examine the quality of the stones and [illegible]

[illegible] basing a lens, in order that full justice may be done the [illegible] should be taken to see that it covers in a bona fide [illegible] size of plate that it is claimed that it should cover.

IN THE LAND OF THE MIDNIGHT SUN

work on a seven-inch or eight-inch plate, by stopping down to an aperture about equal to that of a wide-angle lens, and by its use we will never be able to get close enough to our subject to produce that distortion that we could with a wide-angle lens.

In relation to the matter of distortion by wide-angle objectives, be it said to their credit that they in reality do not distort objects any more than do long-focus lenses. It is the point of view, and not the lens, which governs the perspective. It is in order to embrace a very large amount of subject from a very near point of view that we avail ourselves of the wide-angle lens, and as in our efforts to attain so much we get a distorted picture, we must blame ourselves and not the lens.

We would advise always using a lens of as great focal length as can be brought into play, that is to say, never use a wide-angle lens if you can command sufficient distance for the long-focus lens. Artists cannot bear the highly distorted perspective of very close-at-hand views. Such views are of course less obnoxious if purely landscape—not grand landscape—because the distortion is less apparent than where there are figures present which at once furnish the eye with a definite source of measurement, and than architectural pictures, in which the rapid converging of the right lines of buildings, if too highly distorted, gives the structure the appearance of being out of square—the receding walls looking as if they formed less than a right angle. Some persons will contend that there is nothing objectionable in this distortion, that the perspective of the scene is perfectly correct, and that in order to prove it you have only to hold the finished print within a very short distance from the eye while looking at it and it will appear perfectly true, all of which is true enough, but what comfort have we in looking at a point so close to the eye as to strain it, or in looking at a noble or picturesque building when so close to it that we may touch it with our cane? —unless indeed we wish to examine the quality of the stones and mortar.

In purchasing a lens, in order that full justice may be done the work, care should be taken to see that it covers in a bona fide manner the size of plate that it is claimed that it should cover.

Many a five by eight lens in use is being overtaxed when put upon a larger box than a four and a quarter by six and a half. The result in their use is that the definition must fall off seriously towards the ends of the plate, and in order to obviate this defect the small stops become a necessity, the time of exposure thereby being extended. We are not convinced but that a lens is being worked to the best advantage when only moderately stopped, say to F. 12. Of course for especial purposes, such as copying, and where great depth of focus with extreme definition must be attained, the small stops must be introduced.

The beginner is always mystified by the six stops usually furnished with a rapid rectilinear lens. He does not know what to do with them, seeming to feel that they should all be used. Broadly we would advise never using a smaller stop than is necessary to attain the required definition, and for portrait work invariably approach as nearly as you can to the full opening.

Those amateurs who are blessed with sufficient means to be able to possess three good lenses as previously advised, and can command, by cameras or extensions or kitts, three sizes of plates, say four-and-a-quarter by six-and-a-half, five by seven, and six-and-a-half by eight-and-a-half, may do a great range of fine work, the large eleven or twelve inch focus lens often being invaluable for work upon the cabinet size plate, especially for portrait and figure subjects, and the wide-angle lens giving fine large pictures when confined quarters drive the worker close to his subject.

As in most other matters it is by constant practice that knowledge and experience is gained, and the earnest worker in photography finds in his daily practical trials the needs of the art and the uses of its numerous appliances better than he can by mere theory. He will find out what wonderful capabilities there are in a fine lens. He will become attached to it, and feel proud to be its possessor.

To Remove Rust.—Rust may be removed from finely polished steel without injury to the surface, by cleaning the article with a mixture of 10 parts of tin putty, 8 of prepared buck's horn, and 25 of alcohol, and then rubbing with soft blotting paper.

TONING LANTERN SLIDES.[1]

BY ALFRED STIEGLITZ.

MY late experiments in this line have led me to use the following formula in toning dry plate slides. Over-expose, and develop in such a manner that the slide looks rather flat and under-developed. Fix in hypo, as usual, and then wash under a tap thoroughly (this is of importance to ensure success in the toning operations) for about five minutes.

Make up three stock solutions:

I.—Uranium nitrate	1 part
Water	100 parts
II.—Ferricyanide potassium	1 part
Water	100 parts
III.—Ferric chloride	1 part
Water	10 parts

They are ready for immediate use.

A. In order to get a brown tone, mix ten parts of I. and one part of II. Dip the slide into this, and keep it there for about thirty to fifty seconds; then wash for ten minutes and dry.

B. For reddish-brown tones, take equal parts of I. and II. and proceed as above.

C. Red tones are procured by taking one part of I. and two parts of II., and proceeding as above. Be careful in toning slides with this mixture, as extra care has to be taken in order to keep the high lights clear. A trace of stain does not necessarily spoil a slide. On the contrary, such a slide often looks exceptionally beautiful on the screen. Judging slides by daylight results in misjudgment very often. The only proper way to see what a slide is worth is to project it on the screen.

D. Green-blue tones. After having toned the slides for at least two minutes in any one of the above solutions, A, B, or C, preferably B, wash for three minutes, and then place it in a solution

[1] Read before the Society of Amateur Photographers of New York, Dec. 12th, 1891.

of one part of III. and five parts of water, for five minutes; then wash. The resulting slide will be of a greenish-blue tone, very beautiful for certain effects.

E. Prussian blue tones.—Instead of using one part of III. and five of water, as in D, use the stock solution III. as it is. This tone is very effective for seascapes or moonlight effects.

This process of toning is simplicity itself, and I can only advise every slide maker to try it. In case old slides are to be toned, it is advisable to soak them awhile in water, in order to be insured against uneven toning likely to result if the dry slide be directly placed in the toning solution.

PHOTOGRAPHING ON THE ENGRAVER'S WOOD BLOCK.

BY THOMAS BOLAS, F.C.S.

THIS is very often desirable when a wood engraving is to be made from a photograph, and is indeed largely practised in London at the present time. Of all the methods which have been proposed from time to time, but few survive in every-day practice, as no method which involves a film on the block is allowable, for a film prevents the clean and easy cutting of the wood; moreover, no method which involves the application of liquids to the blocks can be satisfactorily used, as not only would the block be swelled by such application, but the smooth surface, which is so essential for good printing, would become roughened.

Two generic methods involve neither of these disadvantages, and so remain available,—that of Crookes, in which a white, sensitive silver salt (he used silver oxalate) is rubbed on the block, the exposure made, and the wood-cutting performed in a yellowish light; also the photolithographic method, in which a half-tone transfer, in fatty ink, is made, and the ink image is put on the block by contact and pressure. The transfer method is rather complex at best, and some experience is required to obtain full gradation of tone in the transfer; while the Crookesian method is

simple, but subject to the disadvantage of requiring that the engraver should work in a yellow light. The modification I now propose practically obviates this latter disadvantage, and, moreover, does not involve the use of any substance outside the range of those things usually to be found in the equipment of the photographer.

Instead of using oxalates of silver, as Crookes proposed, it is convenient to use chlorides of silver, containing excess of silver and a trace of organic matter, and the following method of working answers well:

Sixty grains of silver nitrate are dissolved in one ounce of water, and to this is added a solution of fifteen grains of common salt, and twenty grains of dextrine, or gum, in half an ounce of water. The whole being well stirred, the chloride of silver soon settles down, when the clear liquor is poured off as closely as possible, and a solution of thirty grains of silver nitrate, in the smallest quantity of water that will dissolve it, is poured on the silver chloride. The whole is now poured on a paper filter, and when the liquor has run through the filter is spread out in a warm place, so that the chloride can dry. The dry chloride being rubbed freely on the wood block, the exposure is made under a negative. This mixture will be found more sensitive than oxalate of silver. We now come to a process of reducing the sensitiveness, which is analagous to the fixing of an ordinary print; and for this purpose a sheet of blotting-paper, a trifle larger than the block, is laid on a glass plate and moistened with strong hydrochloric acid, and made to lie flat on the glass. Three pieces of match stem being placed so as to support the block at the edges, it is placed face downwards over the moistened paper, so as to be exposed to the fumes of the hydrochloric acid, this serving to chlorize the free nitrate, and to desensitize the chloride sufficiently for most purposes. If, however, a more complete desensitizing action is desired, the block may be afterwards fumed in a similar way with ammonia and finally with hydrochloric acid as at first, the trace of acid ammonium chloride thus formed retarding the action of light on the chloride of silver still more.—*The British Journal Photographic Almanac.*

THE PHOTO-ELECTRO-ARTOGRAPH.

IN our January JOURNAL we gave a short notice and illustration of the Photo-Electro-Artograph, or Pictorial Telegraph, the invention of Mr. N. S. Amstutz, of Cleveland, Ohio. Since we published the above notice, the following interesting details of the invention have reached us.

The process is founded on the use of undulatory or varying currents of electricity, somewhat on the principle of the telephone, —the transmitting instrument being actuated indirectly by the varying degrees of light, instead of by sound waves, as with the telephone transmitter. To send a view or a portrait it is photographed on what is known as a "stripping film," composed of gelatine and bichromate of potassium. This mixture, as is well known, is sensitive to light, becoming exceedingly hard and insoluble when exposed, but readily dissolved where shielded from the light. A picture having been taken on a film of this kind, either by exposure, in a camera, or, preferably, by printing through a negative, it is carefully washed with luke-warm water, which removes the portions not acted on by light, and leaves the other portions in relief. So far, there is nothing new in this process, which has long been used for newspaper work, and forms no part of Mr. Amstutz's invention. By this operation the amount of relief is in exact proportion to the light which has acted upon the gelatine, and there is produced a variable surface representing in elevation all the variations of light and shade of the picture.

This film is now stripped from the glass plate and mounted upon a sheet of celluloid, which is wrapped around a perfectly true cylinder mounted on trunnions, so as to permit of revolution. In front of the cylinder is placed a bar, upon which rides a carriage containing a tracing point, which bears lightly upon the gelatine print, just as does the stylus of the phonograph upon the wax cylinder. In the latter the needle trips over the indentations produced in the wax by sound waves, and reproduces them in kind. In the former it rises and falls according to the greater or less relief due to the varying degree of light to which the film has

been exposed, and by so doing varies, in a corresponding degree, the intensity of the electric current which actuates the receiving instrument. Thus far the analogy is very close to a telephonic transmitter, actuated mechanically by the diaphragm of a phonograph. It is clear that if this current can be caused to vary exactly as the elevations over which the stylus passes, the varying strength of the current at the distant point, if plotted, would be an exact fac-simile of the path described by the needle, or, as engineers would say, it would reproduce the profile of the path originally described. Now a single line does not make a picture, although it may form one element of a picture, as it does in this case. To transmit the picture, therefore, the whole of the gelatine film is gone over, the stylus describing a spiral around the cylinder, with its returning paths quite close together, just as the phonograph stylus describes a spiral from end to end of the wax cylinder, and this is accomplished in exactly the same way.

Now, if the carbon button, which permits of sufficient variation in current for the transmission of speech, permitted of sufficient variation for this purpose, there would probably be no better way of varying the current than by its use, but carbon has not this flexibility, and Mr. Amstutz had recourse to another method. The "tracer," as he calls his stylus, is mounted upon a lever, which largely multiplies its up and down movement. This engages with a series of levers mounted on a common shaft, the further ends of these levers being platinum pointed, and serving, when depresséd, to connect the source of current with the line wire. The current enters the machine through this common or tappet shaft, as it is called, and passes to line through the one or more contact points that happen to be depressed into contact with a plate connected with the line wire.

The action is this: Supposing the tracer were on a point of highest relief, only one of these levers would be depressed, and the current would have but a single contact to pass through. Supposing, now, the tracer came across a place with slightly less relief, a second lever would be depressed, decreasing the resistance and permitting more current to pass, and so on until, on passing a point of lowest elevation on the gelatine print, all of the levers

would be depressed, reducing the resistance to the minimum and permitting the maximum current to pass. Of course, the more of these levers there are, the more gradual the variation of current strength sent over the line. The number of these levers or tappets is not limited, but may be anywhere from two to fifteen or twenty, or more, according to the character of the work to be done. The larger the number, the greater the accuracy of the reproduction. For long-distance transmission, especially for newspaper work, a large number of tappets is not desirable, since the degree of delicacy obtained thereby would certainly be lost on the rough paper and in the rapid press-work to which it would be subjected; for all practical purposes a less number of tappets would produce equal results in this kind of work. Furthermore, the adjustment of the sending machine to the varying thicknesses of different gelatine prints does not affect in any manner the receiving machines, so that a picture sent with great delicacy may be received in the newspaper office in sufficiently crude form for its purposes, whereas another machine connected with the same wire and receiving the picture at the same time could reproduce it with the same delicacy with which it was sent—all depending upon the adjustment of the receiving instrument.

The receiving machines are duplicates of the sending machines as far as the cylinder, the carriage, feed, etc., are concerned,—the only difference being the graving arm, which is depressed by an electro-magnet whose strength varies as the current by which it is excited. It is clear that when the transmitting instrument is passing over a low place in the gelatine film, and all the contacts are down, permitting the maximum current to pass, the electro-magnet of the receiving instrument will be at its maximum strength, and the graving tool correspondingly pressed on the receiving matrix and *vice versa*. The receiving cylinder is wrapped with paper covered with a suitable thickness of hard wax. The wax is turned off by a turning tool preparatory to use, just as is the cylinder of the phonograph, and when the impression is complete the waxed paper cylinder is removed, cut longitudinally and rolled out flat, and is ready for the electrotypers.

As an illustration of the manner in which a picture is received, let us assume an hypothetical case. Suppose the wax used to be white and we color its surface black. Suppose the cylinder to be started, and the graving tool but slightly depressed. A very delicate white line with slight depth will be traced. If the same pressure be maintained for several revolutions, there will appear a series of delicate white lines running closely parellel to each other. Now suppose the tracer on transmitting instrument to be passing over a portion of the gelatine print of greater depth, more current would be transmitted, and the triangular shaped graving tool would cut deeper into the wax, the white line would be broadened and the intervening black line made correspondingly narrower. A step further; when the tracer is passing over those portions of the film that are not intended to print at all, the engraving tool will be buried so deeply in the wax as to cut away the black entirely, and in the electrotype made from this matrix this portion would be entirely cut away, so as not to print at all, thus producing in metal a line fac-simile of the gelatine relief from which it was originally produced. Thus it is seen that by variations in pressure of the graving tool all the gradations of light and shade found in the picture on the transmitting instrument may be faithfully reproduced on the receiving cylinder, and then in metal by the electrotype process.

Mr. Amstutz has also succeeded in reproducing impressions in papier mache directly from the wax, so that the engraving can be directly stereotyped in the ordinary manner.

The time occupied in transmitting an ordinary column wide illustration need not exceed eight or ten minutes, and the stereotyping of the reproductions should not occupy more than a few minutes more, so that the reproduction can be placed upon the newspaper printing presses along with the press dispatches descriptive of the subject to be illustrated.

By a system of gears on both the transmitting and receiving instruments, it is possible to change the size of the picture at either end of the line. That is to say that a picture can be transmitted either larger, the same size, or smaller; and at the receiving end, if there be several instruments, they may each reproduce

it on a different scale. Of course much greater accuracy is attained if large originals are used and they are reproduced on a smaller scale.

A single transmitting instrument is capable of actuating a large number of receivers at different points; thus the same picture may be simultaneously reproduced at a number of widely-scattered news centers.

If it is desired to send hand sketches, a process has been devised by which a special artist can make his sketches "on the spot" by suitable washes, preserving all the half tones that he may deem necessary to the correct pictorial representation, and upon the completion of the sketch it is wrapped round a transmitting cylinder, and by a simple adjustment of the tracer, the machine can be left to itself until the whole picture is transmitted to its destination, where it is automatically reproduced, a complete line engraving.

It is claimed for this process that the depth of engravings can be increased over 100 per cent. above that reached by the deepest half-tone engravings, thus adapting the work to uses for which the latter, on account of their shallowness are unsuited.

Besides the use of wax as a receiving substance, Mr. Amstutz says it is quite possible to engrave directly on metal; and he expects to find large application of his device for reproducing portraits, photographs, and conventional designs, both singly and in multiplicate, on silver and other metal ware, principally at local points.

Criminal Identification.—Photography has rendered valuable aid in the detection of criminals; but it is sometimes possible to baffle identification by means of a photograph, and several novel methods have been suggested from time to time to render escape less easy. The finger-tip method was explained in the Demography Division of the Hygiene Congress. A print is taken of the bulk of the ten digits and a note taken of the pattern of the print. Evidence was given of the persistence throughout life of the minutest details of the prints. Valuable as the method may be, there will be some hesitation in depending upon its results alone.—*Photography.*

WANTED—COMMON-SENSE IN THE POST-OFFICE DEPARTMENT.

OF late there have been numerous complaints from publishers in different parts of the country about what may be called a too-rigid construction of the postal laws.

During the past month we had a somewhat similar experience on account of the non-arrival of our illustrations from Germany. We were unable to illustrate our paper upon the new Photo-Tele-Objective, consequently on the last moment, after our edition was all printed and ready for the binder, we had the following notice printed and bound up with the edition:

"**Special Announcement.**—In our next number for March we will present two illustrations, from the same standpoint, about 440 yards distant from the object, one made with an ordinary lens and the other made with Dr. Adolph Miethe's new Photo-Tele-Objective, which will illustrate the possibilities of the new invention. The picture with the new objective showing details not discernible to the naked eye, nor obtainable with the present system of photographic objectives and portable outfit."

After the edition was wrapped and directed, it was sent as usual to the main post-office at Philadelphia for transmission as second-class matter. To our surprise, notice was sent that the journals would not be forwarded. On inquiry at the mailing division we were courteously informed by the superintendent that the present edition would not be passed as second-class matter on account of the objectionable advertisement on the front,—viz., our innocent announcement as quoted above. Upon demanding the authority for this seeming arbitrary ruling, we were referred to a clause on page 20 of the "Official Post-Office Guide for Philadelphia," viz.:

"All advertisements in magazines must be permanently attached thereto by binding, printing, pasting, or otherwise, and must be of uniform size with the pages of the publication."

All our argument that the insert was no advertisement, but a snpplement, and allowable (*vide* page 19 of "Guide"):

"Publishers of second-class matter may, without subjecting it to extra postage, fold within their regular issues a supplement; but in all cases the added matter must be germane to the publication which it supplements; that is to say, matter supplied in order to complete that to which it is added or supplemented, but omitted from the regular issue for want of space, time, or greater convenience, which supplements must, in every case, be issued with the publication."

failed to impress the official, he stating that as the page was shorter it debarred the whole edition.

The upshot of the matter was that the whole edition had to be taken out of the wrappers, the objectionable announcement cut out, then re-wrapped and directed, after which they were received by the postal authorities for transmission through the mails as second-class matter.

If we mistake not the general impression among the public is that the post-office department was started by the people for the people, and was intended to disseminate news and information to the people, and not to hamper honest publishers, or to put them to unnecessary trouble, delay and expense.

Many are the complaints of late against the conduct of affairs in the Philadelphia Post-Office, and if we mistake not a short time ago they became so loud and deep that a special commission was appointed to investigate the office. If this stirring up of the local office has had anything to do with the extraordinary strict construction of the existing law, as instanced in the present case, it would be as well for the overzealous officials to bear in mind until the law can be changed that the statute was never intended to check honest enterprise nor interfere with legitimate business interests. J. F. S.

Discovery of Planets by Means of Photography.—Dr. Wolf, of Heidelberg, Germany, has discovered two minor planets by means of photographic plates taken on December 22d and 23d last. One of these is new (No. 323), but the other is is probably identical with Sapientia (No. 275), which has only once been observed,—in opposition.

OPENING OF THE NEW ROOMS OF THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.

THE new quarters of the Photographic Society of Philadelphia on the second floor of the new Fuller Building, No. 10 South Eighteenth Street, were thrown open on the evening of January 21st for the inspection of the members and their friends. The hall and library were brilliantly illuminated, and more than a hundred pictures, the work of the members, adorned the walls. The proceedings proper were opened by the president, Mr. John C. Bullock, after which the company were entertained with a fine exhibition of lantern slides. A light collation closed the exercises of the evening.

The new quarters, of which we give the ground plan, are the most complete and commodious of any photographic society in the country, nor can any similar organization boast of so large a gallery, as well lighted or adapted for exhibition purposes, not to forget the pleasant entrance and wide staircase.

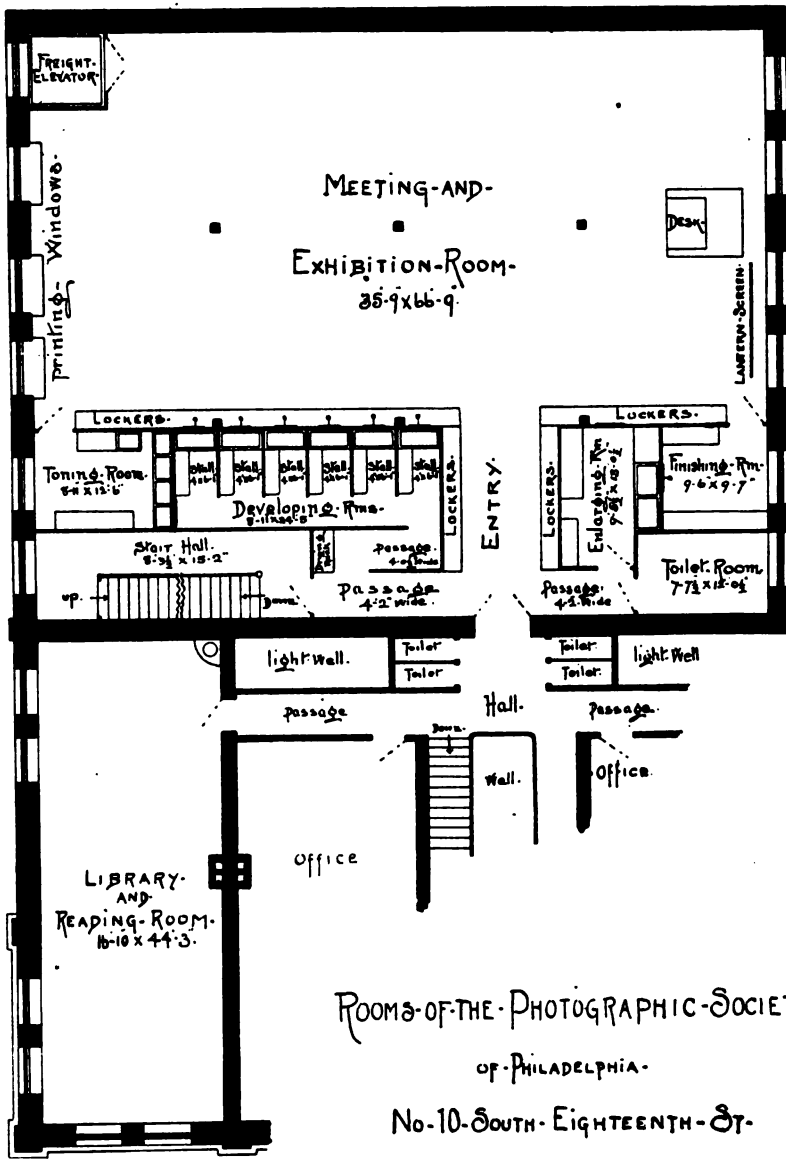
The library, which fronts on Eighteenth Street, 16 feet 10 inches by 44 feet 3 inches; is all the name implies, well lighted and comfortable, being amply provided with the current photographic literature.

The meeting and exhibition room, 53 feet 9 inches by 66 feet 9 inches, as will be seen by the annexed plan, is divided into two parts, the larger for meeting purposes, the smaller for practical photography in all branches. The six dark rooms are arranged with a circuitous entrance which dispenses with doors, yet shuts out all light while admitting ample fresh air. The plumbing arrangements are entirely new and a model of their kind, the sinks being galvanized iron or slate. The necessary light is placed outside of each dark room in front of a triple sash. The first is of a ground orange pot metal, the second of regular ruby, the two combined making an absolutely safe light. The third is an opaque shutter, by which all light can be excluded if desirable. Each dark room is equipped with the requisite wash-boxes of an improved pattern, a shelf for hypo pans and graduates.

The same care is exercised in the equipment of the toning room. The tanks here are of slate, which when in use fill and empty themselves automatically, extra precautions being taken to prevent damage by overflow.

A gas stove is also supplied for such as wish to work the hot platinum process. The enlarging room, which is not quite completed, will when done probably contain an electric arc light for enlarging and

lantern slide making. All necessary requirements, such as large sinks, etc., are already in place. In the extreme northeast corner is the finishing and mounting room.



One of the most novel features of the plant is the drying closet, where negatives are placed after the final washing. This is so constructed as to secure a constant current of air over each shelf when the doors are closed.

The society's annual exhibition opened in the rooms during the week February 1st to February 6th. The four pictures receiving the highest number of votes from the members, which entitles them to rank as "Honor Pictures," were: "On the Blue Juniata," by W. H. Rau; "Navigation," by Robert S. Redfield; "The Loew-Vand, Norway," by Dr. C. L. Mitchell; "The Village Mill," by C. H. Miller.

A VETERAN PHILADELPHIA PHOTOGRAPHER.*

GEORGE FRANCIS SCHREIBER, who thirty-five years ago was a prominent photographer of this city, and well known throughout the country as a photographer, died recently of bronchitis, the outcome of an attack of la grippe. Mr. Schreiber was almost eighty-nine years of age, and was sick but a few days. He leaves eight children, six of whom are stalwart sons and finished photographers.

Mr. Schreiber was born at Frankfort-on-the-Main January 10th, 1803, received an elementary education, and learned the trade of a printer, working afterwards as a journeyman at Bremen, Hamburg, and St. Petersburg. In 1834 he came to this country, and with a Mr. Schwatka established a paper called *Die Alte und Neue Welt—The Old and New World.* Later, Frederick Langenheim, a relative of Voigtlander, a Vienna optician, whose descendants are famous as photographic instrument makers, obtained from him a camera obscura, accompanied with instructions for its use. Thus provided, Langenheim entered into partnership with Schreiber.

Experiments were made in taking daguerreotypes at first on the roof of a building on Dillwyn street, just below Willow, in 1844, the children of Mr. Schreiber being used as subjects and models. When sufficient progress had been made a room was taken in the Philadelphia Exchange, at Third and Walnut streets, and later quarters were secured at No. 216 (old number) Chestnut street, partly occupied by James S. Earle as a picture store. Here a thriving trade was carried on, and Mr. Schreiber so improved in the art and science that he made a large sectional camera, and made a view of Niagara Falls that was highly complimented in the award of medals, and received a flattering letter from Queen Victoria.

Mr. Schreiber was constantly investigating and improving his

* This article was unavoidably crowded out of our last number.

processes of picture-making, and at this time Fox Talbot came with his talbotype that revolutionized the business for a while. Its imperfections soon began to retire it when, in 1848, Mr. Schreiber heard that glass had been used in Europe as a negative. He went to work in great earnest, and in a short time succeeded in printing through glass the first photograph ever made in America. These pictures were at first called "talbotypes on glass." Next Mr. Schreiber used ground glass, and produced the hyalotype, from which were evolved the first photographic stereopticon views in the world.

Successful photographic prints were not made by the firm until several years later. As the art became better known the photographer grew fastidious, and strove to do better work. Considerable difficulty was experienced in developing the negatives and in giving the prints a clear and perfect tone. While Mr. Schreiber was patiently striving to improve these matters the Langenheims withdrew from the firm, and Frederick went to Brazil to make daguerreotypes, while Mr. Schreiber, continuing the photographic business alone, removed to Fourth street and Harmony court.

At this time negatives were developed by the use of gallic acid, and although the process was unsatisfactory and often uncertain, Mr. Schreiber's repeated attempts to improve upon it were not successful. In the matter of toning he was more fortunate, as he accidentally discovered a new process.

A man named Cutting, a resident of Massachusetts, who had taken to photography, seeing one of these well-toned photographs, came to Philadelphia and offered Mr. Schreiber, in exchange for the secret of his thing, a process which he said would be worth millions. Cutting's preparation was a solution of gun cotton in ether, known as collodion, which has since come into universal use in photography. In compliance with a promise formerly made to his partner, Mr. Schreiber refused to give up his secret; otherwise his gain would undoubtedly have been great, both financially and in an artistic way.

Mr. Schreiber afterwards removed to Arch street, where, under the name of Schreiber & Sons, he conducted a portrait studio for many years. Growing tired of the whims and caprices of human subjects, he abandoned this branch and devoted himself wholly to the photographing of domestic animals. Of late years, with the aid of several of his sons, Mr. Schreiber has made pictures of almost every crack bird and the most noted cattle and horses between the Gulf of Mexico and the upper border of Canada, not to mention his photographs of dogs and fancy fowls, while his "Studies from Nature" rank among the finest photographs the world has produced.—*Telegraph.*

NEGATIVES BY A. McFARLIN,
Mansfield, O.

Prints on
ALPHA ARISTOTYPE PAPER

AMERICAN JOURNAL

OF

PHOTOGRAPHY

THOS. H. McCOLLIN, M[illegible]

[illegible] Editor [illegible]

[illegible] APRIL [illegible]

PRACTICAL [illegible] CONCERNING ARISTOTYPE

AT the pre[illegible] of the leading problems with [illegible] professional [illegible] is the manipulation [illegible] called aristotype [illegible] the country. [illegible] aristotype from the Greek [illegible] and *tupos* type [illegible] given to this popular paper by [illegible] of [illegible], Germany, it being a modification of the [illegible] first introduced by G. Wharton Simpson in the year [illegible] which [illegible] the [illegible] At the present time [illegible] papers consist of two kinds, viz., the [illegible] the paper [illegible] with a [illegible] salts [illegible] suspension,—[illegible] paper.

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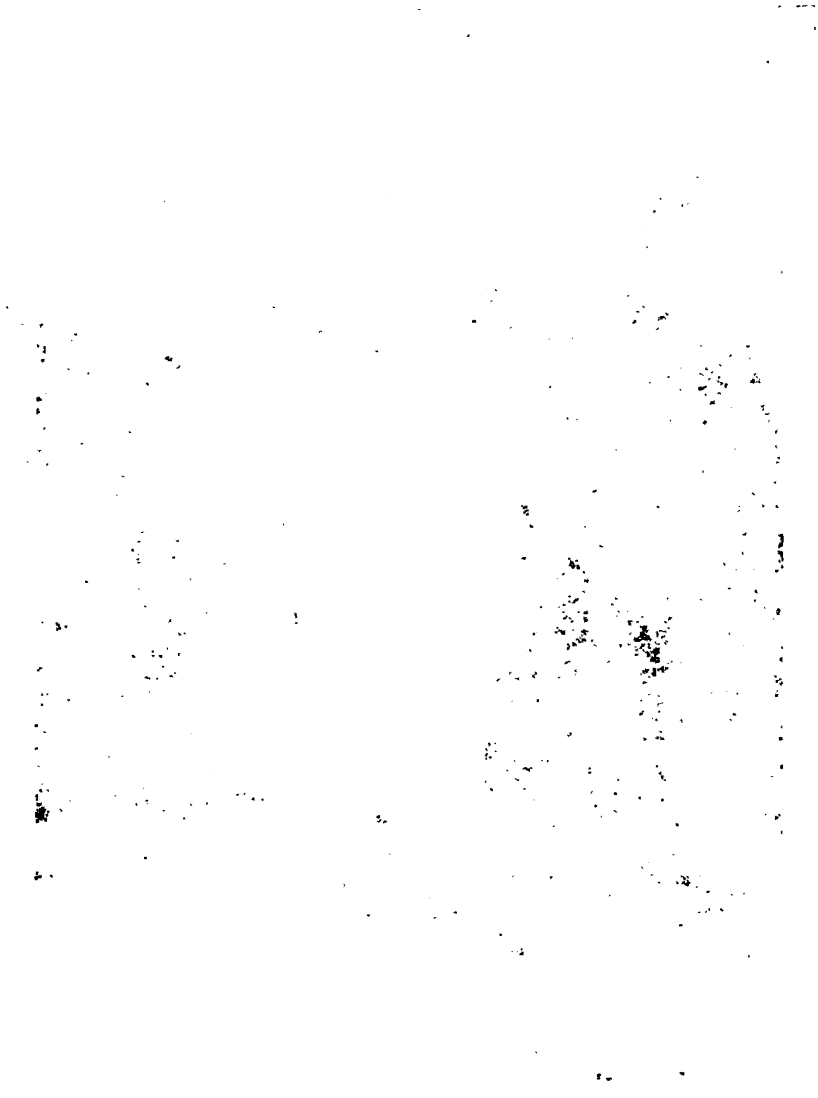

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AMERICAN JOURNAL
OF
PHOTOGRAPHY

THOS. H. McCOLLIN, Managing Editor.
JULIUS F. SACHSE, Editor. XANTHUS SMITH, Associate Editor.

VOL. XIII. APRIL, 1892. No. 148.

PRACTICAL HINTS CONCERNING ARISTOTYPES.

AT the present time one of the leading problems with the professional photographer is the manipulation of the various so-called aristo papers, which have lately come into favor throughout the country. The name aristotype, from the Greek *aristos* best, and *tupos* type, was given to this peculiar paper by Dr. Liesegang, of Dusseldorf, Germany, it being a modification of the process first introduced by G. Wharton Simpson in the year 1865, which became known as the "Simpsontype." At the present time these "aristo" papers consist of two kinds, viz., the original or older type, where the paper is coated with a collodion emulsion, which holds the silver salts in suspension,—strictly speaking, this is a collodio-citro-chloride paper.

The more modern type, and which it may be said, forms the great bulk of aristo paper now placed in the market, is coated with a gelatine-chloride emulsion, a difference which should be carefully noted by all workers, as certain manipulations which give beautiful results with the former type of paper almost instantly destroy the latter.

Of late we have had considerable inquiry from users of these papers as to the method for obtaining the best results. Then again we are in receipt of letters condemning the various emulsion papers, while the same mail perhaps brings us from other

parties specimen prints upon the identical paper to show what exquisite results can be obtained upon an emulsion paper.

As there seems to be so wide a diversity of opinion upon this class of papers, and in view of the fact that the universal feeling among professional photographers is to avail themselves of the exquisite results attainable upon aristo papers, provided that the effects would be as certain as with the ordinary albumen paper, we have written to four of the leading makers of emulsion papers, asking them for the formula and method of manipulation which had in their own experience given the best results with their special make of papers. These replies we now present to our readers in the order in which they were received.

Whether or not emulsion papers will supersede those coated with albumen is, as yet, a question hard to answer, but it certainly seems as if a radical change in the production of photographic prints were imminent, and judging from the photographic show-case it looks as if the inclination of both public and photo-artist leans strongly in favor of these collodio-chloride and gelatine-chloride papers, to the detriment of the familiar albumen print.

Another great point claimed in favor of the aristotype, exclusive of more beautiful results, is the simplicity of manipulation, as the prints can either be fixed and toned separately, same as an ordinary albumen print, or else toned and fixed by a single operation, the former method, however, being the most preferable for the professional.

What faults and shortcomings there may be in the aristo papers now upon the market, will without doubt soon be corrected and overcome, as the rivalry between the various makers for the control of the trade will surely give us a perfect paper in the near future. Whether this will prove a combination of our two present rival processes, or an entirely new emulsion, time alone will tell.

Among the curiosities in literature we note "Modern Vienna Grave Monuments,"—the artistic embellishments of Vienna burial grounds, with an introduction by Dr. Albert Ilg, Vienna, 1891. An edition de luxe, consisting of thirty photogravures.

HOT WATER AND AMERICAN "ARISTO."*

Written expressly for the AMERICAN JOURNAL OF PHOTOGRAPHY.

BY C. S. ABBOTT.

THE discovery of a hot water treatment for American "Aristo" paper has eliminated much of the time formerly taken in manipulation, and has also reduced the cost of the finished print very materially. For the past three weeks this treatment has been in practical use in the largest galleries in Chicago, and has proved a brilliant success. Prior to this hot water treatment "Aristo" prints required a first washing, then softening in an alcohol bath, washed several times, toned and fixed. Now, the prints are not handled or touched after placing them in the first wash until they are toned, requiring no softening solution. The latest method approved by the leading galleries is as follows:

Directions.—Water to be used to feel decidedly hot to the touch, but not so warm as to be uncomfortable to the hand.

First, a large shallow smooth-bottom tray is washed out with hot water. This cleans and warms the tray. Then a little warm water, just enough to saturate or thoroughly dampen the entire batch of prints, is poured into the tray. The prints are taken one at a time, pressed flatly down on the bottom of the tray, one overlapping the other an inch, or so much as prints are ordinarily placed on the pasting glass. Each print as it is put in is patted down until it sticks flat to the bottom of the tray, or to the print under it, which it will readily do if too much water is not put in the tray. When the prints are all in, and are sticking flat and damp to the bottom of the tray, they are allowed to remain in this condition five minutes. The tray is then inclined, and the water

* It is but just to say that the theory for the use of hot water for papers of the collodio-chloride type is due to A. W. Clark, of St. Louis, who was the first to suggest, about a year ago, hot water as a cure for blisters in albumen paper. But one would here again emphasize that where hot water works beneficial with collodio-chloride papers, such as the American aristo paper, it would, if brought in contact, at once destroy any gelatine-emulsion paper, such as the Omega, Alpha, New York Aristo, etc.—ED. AMERICAN JOURNAL OF PHOTOGRAPHY.

pressed thoroughly out of the prints. Then enough hot water is put in to well cover the prints, and the tray is gently rocked so as to give the water a chance at the prints, although they are not allowed to swim on top of the water. After five minutes this water is changed, and this washing repeated three times, making five hot water baths in all, of five minuets each. When each water is poured off, the prints are pressed flat with hand to remove all water possible from them. When water is poured in, it is done at one corner of tray, not directly on to prints. The prints should not be separated or handled over from the time they are put in at first washing until they are taken out of the cold bath to tone.

Upon pouring off the fifth hot water, cold water is now admitted to the tray, and they are allowed to remain in it until they are taken out to tone. Any good albumen bath will make a superior tone on "Aristo," but it must be understood that not half the gold and alkali is required to the same amount of water as is used with albumen.

A liberal bath as to volume should be used, and the speed of the bath not be faster than eight minutes. The bath should always test as near neutral as possible, and never more than very slightly alkaline. A decidedly alkaline bath makes muddy tones. As the prints are taken from the toning bath they are thrown into a tray of cold water, made decidedly acid to the taste by a few drops of acetic acid. They are now fixed in a hypo bath much weaker than that used for albumen. Twelve hydrometer test is sufficient, or about one ounce of a saturated solution of hypo to every ten ounces of water. It is important that this fixing bath should have sufficient bulk for the number of prints to be fixed, and should contain not less than sixteen pints of bath for every hundred prints, and then should not be used again. One hour in a tank of running water that siphons completely off, is sufficient for the final washing, or six or eight changes of water when prints are separated by hand. The mounting does not differ from albumen, except that a little heavier paste is used of half flour and half starch. The prints should be rubbed down on to the mounts heavily between clean blotters and with a squegee roller.

The spotting color for "Aristo" prints should be mixed with the white of egg to prevent coming off in the burnishing.

As may be seen from the above, the manipulation is very similar to the albumen process, the only essential difference being the manner in which the prints are first dampened, and the use of the hot water.

Jamestown, N. Y.

WORKING OMEGA.

BY C. E. HOPKINS.

Written expressly for the AMERICAN JOURNAL OF PHOTOGRAPHY.

USE negatives of ordinary strength. Print about the same as on albumen paper. Wash prints face down in cold water through several changes until all free silver is removed, which is not complete until water remains clean, showing no milkiness Soft water is preferable.

Prepare the following solutions:

No. 1.—Chloride of Gold . . . . . 15 grains.
Water . . . . . 15 oz.

No. 2.—Borax—saturated solution for toning bath.
Water . . . . . 20 oz.

No. 1 . . . . . 1 oz.
No. 2—sufficient to neutralize, testing with litmus paper.

As each print reaches the desired tone place in salt water, until all are toned, rinse and fix in the following for twenty minutes:

Water . . . . . 1 gallon.
Powdered Borax . . . . . ½ oz.
Hyposulphite of Soda . . . . . 8 oz.
Powdered Alum . . . . . 2 oz.

Use hot water to insure perfect solution.

This bath must be made two days before using, so as to become clear. The best way is to make up large quantities, as it will keep. Do not try to use a plain fixing bath, as it will soften the

film. After prints are fixed, they must be washed thoroughly; the best way to do this is to change from tray to tray, one print at a time. Lift prints from the water on to a glass, drain and mount as you would albumen paper, using good stiff paste.

When sufficiently dry they may be retouched aud burnished in the ordinary way, using castile soap or any good lubricator.

Notes.—Handle prints with face down in all solutions, and *keep them moving.* The *action* of the toning *must* be slow. Do not put too many prints in the toning bath at once. *Do not use warm water.* Avoid touching surface of paper with fingers before it is fixed. Do not use *metal trays* in any part of the process, or black spots may appear. If the burnisher is too hot it will turn prints red.

A milkiness or whitish appearance may be the result of insufficient washing or too strong toning bath. Red spots or streaks are caused by lack of proper manipulation when toning.

If prints are damp when burnished they are liable to have a grainish appearance. Softening of the film may be overcome by first soaking the prints about five minutes in weak alum water, use 1 to 2 oz. of alum to a gallon of water, but the alum must be previously dissolved.

Notice may be taken that the alum in proportion to the hypo has been cut down. I find that this amount thoroughly hardens the film, and at the same time a softer print is produced, the greater amount of alum producing harshness and a bleaching effect. It is also advisable not to use over one ounce of borax to the gallon of water. The ratio of hypo and water is much less in the above than is usually considered necessary for albumen paper. I have found that when using the regular bath of 1 to 10 the hypo continues the toning, giving it a bleaching effect.

The above bath produces pure whites and best results for all classes of work. The combined bath when used with care gives good results for ordinary work, but cannot be relied upon so well for fine whites. On account of its ease in working it is a favorite with many professionals as well as amateurs.

CHLORO-CITRO, OR ARISTOTYPE PAPER.

DR. LEO BAEKELAND.

Written expressly for the AMERICAN JOURNAL OF PHOTOGRAPHY.

THIS paper was first manufactured commercially in Germany, by Obernetter (Munich), Stolze (Berlin), and Liesegang, (Dusseldorf).

The growth of its use has been slow but gradual. As an amateur I was one of the first to adopt it, as prints made on this paper show great superiority over albumen prints. It gives details which no other printing method can bring out, and the prints are more brilliant and show more gradation of tone than those made by any other process.

The light-sensitive medium, in aristotype paper, is a mixture (or perhaps a compound) of chloride of silver and citrate of silver, which is held on the surface by means of gelatine or gun-cotton, according to the way the paper is manufactured. As we have gelatine and collodion aristotype papers, and both kinds are now manufactured on a large scale in this country. So far as my experience goes, I can say that the domestic article shows a marked superiority over the foreign brands.

The price, too, is getting lower every day, and is actually cheaper than ready sensitized albumen paper; indeed, if we consider all the advantages of the aristotype paper, there is no reason why it should not be preferred to albumen paper in all its considerations.

As I am particularly familiar with the manufacture of aristotype paper, I can state that it is a good deal more difficult to make a good collodion than gelatine aristotype paper, and this is certainly one of the reasons why gelatine aristotype paper is superior to nearly all brands of collodion paper now on the market. It appears as if the toning bath did not penetrate so easily the gun-cotton film. In fact prints made on this paper have a decided tendency to tone irregularly and to curl in the toning bath. On account of this property, preliminary soaking in alcohol or special

toning baths have been recommended, but all this makes the process more complicated than the use of albumen paper.

The printing paper that gives the best results with the minimum of trouble will always have the best chance for popularity. There resides the superiority of gelatine paper. I have been advocating this idea to the makers of New York aristotype paper, and they have now put in the market, a splendid gelatine paper that can be handled in the same way as albumen without the troublesome sensitizing and fuming operations. I have tried several toning formulas, with this paper, such as are used for albumen paper, and all seem to work equally well. So great is the similarity of manipulation that I have often toned albumen and aristotype prints in the same bath without any special precaution, and obtained beautiful results. Fixing and mounting is done in the usual way.

Toning baths should never be acid; they should be either neutral or slightly alkaline. Slight alkalinity does not injure gelatine as much as it does albumen prints.

For toning I keep a stock solution containing 15 grains of gold and sodium chloride dissolved in 200 c.c. water (about 7 ounces). With this solution I can prepare my toning bath at once by diluting it with about five parts water, and adding about half a teaspoonful of bicarbonate of soda for every 200 c.c. (7 ounces) of toning bath. Before toning the prints are soaked in water and washed exactly the same way as albumen prints. Toning should not be carried too far, as the tones darken considerably after the prints are dry. I fix the prints in a fresh bath of hypo at 5 per cent., in which they are kept for about ten or fifteen minutes. In order to harden the film, I recommend the addition to the toning bath of about one-third its volume of saturated solution of alum. This solution can be kept in stock in a large bottle. Prints on gelatine aristotype paper can be burnished in the same manner as albumen prints, and the gloss is exceedingly brilliant. They can be enameled with very little trouble by squeezing them, when wet, on celluloid or ferrotype plates, which are previously rubbed with powdered talc. If this operation is properly done, and if you let the prints dry slowly, and are patient enough to wait until

they are thoroughly dry, they will peel off without any trouble; but you will have poor success if you try to do it in a hurry.

The great facility with which this paper can be toned has induced those who used it to prescribe compound baths, containing at the same time gold, fixing compounds as hypo and sulpho cyanides and other compounds. Many formulas of this kind have been published and are used more generally by amateurs than by professionals. If the use of such baths simplifies the manipulation, they cause irregular toning and lack of permanency in the prints. You are never sure whether your prints are really toned with gold, or are produced by sulphuration; it is a known fact that prints can be toned without gold, as long as there is silver in *status nascendi* in such bath, but whether such prints are permanent or not is a question which I am very much inclined to answer in the negative.

Taxing Amateurs.—Herr Brand, a Viennese photographer, has suggested to the Finance Minister of his native country the levying of an annual tax of twenty-five florins on amateur photographers; but the Minister having closed his eyes to this seductive idea for increasing the revenue, the aggrieved Herr Brand has delivered himself of a long letter to the *Vienna Tageblatt*, in which he lays bare his reasons for his suggestion. These are, of course, that amateurs are the ruin of professional photography, etc. He admits that there are some amateurs out of whom professionals make a profit, but these, he says, are in the minority. He bitterly complains of those who lend their cameras to friends, and who employ photography for commercial purposes, thus taking the bread out of the mouths of the ill-used professionals. He believes that a tax would change all this by discouraging the employment of the camera amongst amateurs, and so bringing back a great deal of work to the professional. Herr Brand seems to have succeeded in nothing so much as getting himself well laughed at for his pains.—*The British Journal of Photography.*

A set of lantern slides, says the *Optical Lantern Journal*, of monkey's hands would be rather an unusual order for a dealer to supply, but such will be projected at the next lecture given by Miss Dalrymple, the palmist, who intends discoursing upon the head, heart and life-lines of gorillas.

THE FADING OF SILVER PRINTS ON ALBUMENIZED PAPER.

BY ELLERSLIE WALLACE.*

THE fading of silver prints on albumenized paper is an interesting matter, but one about which we know very little. Those of us who have given the subject any attention, have been struck with the singular fact that skill and care on the part of the maker of the prints is no guarantee of their permanency. In fact, numerous cases could be quoted where prints made in the most slovenly manner, with poor materials, and by men so ignorant that they hardly knew the names of the chemicals handled, have actually outlasted the best efforts of skilled and careful photographers.

In most other departments of practical photography, we could say that more careful investigation would help us in determining the causes of fading, even if it proved impossible to entirely do away with them. But the subject is an exceedingly difficult one, partly owing to the complex chemical nature of the silver print, and partly from the impossibility of watching the behavior of batches of prints, or even of individual prints out of a given batch, for years at a time, and of obtaining data as to their manufacture which would be of any practical value.

From the earliest days of silver printing, imperfect removal of the hyposulphite after fixing has been cited as a pregnant cause of fading. Althoug I do not at all mean to inculcate any carelessness in the operation of final washing, I am satisfied that the dangers from the said source have been much overrated. Assuming that a good commercial sample of the hyposulphite is used, and that no foreign matter, like acids, be allowed access to the fixing bath, there is really no reason why a print shoul not last well even if quite a large quantity of the fixing salt remains in the paper. Of this fact I am certain. I have seen prints made by an experienced maker of albumenized paper, which had merely received

* Read before the Photographic Society of Philadelphia February 10th, 1892.

a couple of rinses after fixing, and were then immediately dried. These prints were several years old when I saw them, and had remained perfect in every respect. This gentleman agreed with me in condemning the excessively long soakings and washings then customary, sometimes lasting for four and twenty hours. Experiments made after my interview with him bore out his statements to my perfect satisfaction.

I will now ask your attention to a point in silver printing which I have been led to believe has an influence upon the permanency of the print, and one which I do not remember to have either read or heard mentioned. Let me say, however, that I do not advance it as an universal cause of fading, but as one of the ways in which an explanation may be given of the wonderfully contradictory behavior of prints from the same batch, made in the same manner.

Everyone who has tried silver printing, is aware that even and successful toning of the print cannot be accomplished if there is free nitrate of silver left in it, but that the said salt must be washed away before the print is risked in the gold bath. Neglect of this means red patches and streaks, alternating with ashy blue tints and measliness over the entire print, and oftentimes precipitation of the gold in the bath and consequent stoppage of the toning action. But this is not all.

The proper forming of the image of a silver print demands the harmonious chemical action of three distinct compounds of silver The first, chloride of silver; the second, the organic colorific compound of albumen and nitrate of silver; and the third, free nitrate of silver in excess. When a print is taken from the frame and washed, the chloride and a certain portion of the darkened organic compound remain unaffected, while the free nitrate, and in all probability a considerable amount of the organic compound, are washed away. Now the point which I desire to ask your consideration of, is, whether the too complete removal of this organic compound, in the washing before toning, may not injure the stability of the print by robbing it unduly of one of its important component parts before the gold has had permanent abode in the print? The objection may be raised that the hyposulphite

would remove it in the fixing, but if the gold is well deposited upon it, it would remain.

I am aware that the idea may seem far-fetched, but we can find analogies to it in several departments of photographic chemistry. Take, for instance, the manufacture of washed collodio-bromide pellicle. Here the bromide of silver is formed in the collodion by adding nitrate of silver to collodion containing a soluble bromide. In order to get rid of the bye-salts which come from the double decomposition between the bromide and the nitrate, the emulsion, after setting, is washed in water to remove them. But it sometimes happens that the pyroxyline is of a variety that will not bear the washing without parting with an organic compound between the silver and the pyroxyline which seems to form during the ripening of the emulsion. When such is the case, the resulting pellicle gives thin, foggy negatives, and is in every way unsatisfactory. It was long ago discovered that nitrate of silver reacts with such substances as albumen and gelatine (less so with pyroxyline), entering into combination with them; and as I have already said, the albumen compound is the important colorific substance of the silver print. Another fact that seems to help in bearing out my idea is, that prints from which all traces of silver are thoroughly eliminated, as, for instance, by prolonged boiling in some chlorinous solution, refuse to tone.

We are therefore driven to the conclusion that prints must contain an appreciable quantity of silver in order to take the gold properly during the toning. But on the other hand we know that an excess of the silver is incompatible with good toning, as I have already remarked. It may then fairly be asked how long the prints ought to be washed before toning, and the answer to this question can be found only in practical experience. A batch of, say, one hundred and fifty 8 x 5 inch prints, put into one of the longest porcelain pans obtainable at the stock-dealer's, and set under an ordinary dark-room tap, would contain a large amount of free silver after half an hour's washing, while a dozen prints of the same size would probably be ready to tone after ten minutes' immersion or less.

But another objection may be raised. The question will be asked, why some prints from every batch fade in a comparatively short time, while the rest remain white for years and years. Now to answer this I must ask you to remember that excellent as our commercial brands of albumenized paper are, it is an impossibility to coat sheets with albumen so evenly that it shall be of just the same thickness or body at every part of the sheet. The behavior of the prints, both during the printing and after they are finally dried, proves this. Every practical printer knows the value of the "thick ends of the sheet," and if he is a careful workman reserves them for the most difficult subjects. Prints made on these "thick ends" will curl in a refractory manner when dried, owing to the heavy body of albumen on the paper, while those made on the more central portions of the sheet remain flat. Remembering this, is it not fair to assume that prints, even when made from the same sheet of paper, will not part with the organic silver compound equally when washed before toning, owing to the variable thickness of the albumen, and will thus present to the gold a variable quantity of the important organic constituent?

Before proceding further, let me say that I hope this theory is not a tenable one, for if true I do not see how things could ever be improved or rectified. I am afraid, however, that there is some truth in it. The fact that prints toned in the chloride of lime toning bath, without any washing whatever to remove the silver after coming from the frame, last fully as well as others made in the usual way (better, indeed, in some cases), is another item in support of the view I advance.

An enumeration of all the possible causes of the fading of silver prints would be indeed lengthy. But I wish to direct attention to the want of reliability of a mountant which, until very recently, I had always considered quite safe, and have myself largely used. I refer to gelatine, either when dissolved in water alone, or in water with alcohol added, to prevent cockling of the mount, not only as a mountant in the usual sense, but also, I regret to say, as a material for cementing prints to glass, or as a sizing. My attention was first directed to this by an able editorial in the *British Jonrnal of Photography*, in which the

statement was made that there had been complaints of the beautiful "cemented prints" fading in a surprisingly short time. I had scarcely read this article when I became aware that a handsome frame full of cemented prints, owned by this Society showed unmistakable signs of fading, and when I last saw them they were in a very bad state. Prints of my own make, with the greatest care and best obtainable material, have behaved in the same manner. I am also informed by one of Philadelphia's oldest and most learned photographers that a particular style of print in which he used gelatine in one of the finishing processes, has not lasted as well as he might have expected, after the great care expended upon them, and the same gentleman strongly condemns the practice of mounting prints on cards with gelatine in any form, preferring starch. My own experience goes to the support of this statement in the most positive manner; prints that I have had by me for more than twenty years, and mounted with starch, have lasted well, while almost every gelatine-mounted print in my possession has faded more or less according to its age. I am the better prepared to say this from the fact that I have within the past few days carefully reviewed the contents of a portfolio that had been laid away for many years.

If I were asked what are the important matters to care for in printing, as regards permanency, I should reply: a good albumenized paper, *free from smell;* worked on as strong a silver bath as the salting of the paper would allow; toned rather rapidly, after the minimum of washing, and, if necessary, adding common salt liberally to the toning bath to make up for it; to wash off the gold thoroughly before fixing, and to have the fixing bath strong and lukewarm to the finger; to work the prints about thoroughly during the fixing and the first rinses after fixing; to wash them in *rapid changes* of water; to avoid gelatine as a mountant; and, finally, to rub in wax after rolling; the best means being to reduce pure white wax to the consistency of soft butter with turpentine and a little oil of lavender. I prefer this to the ordinary burnishing.

LIFE-SIZE PORTRAIT HEADS.

A. MAHLSTOCK, F.R.A.

WHEN the photographer wishes to obtain large portrait heads without resorting to enlargements, it becomes necessary to use an objective of great focal length. If this is not done, certain peculiarities appear in the portrait which are frequently to be noticed in three-quarter and full-length pictures. These peculiarities, so common to objectives of short focal length, are commonly called distortions. Mathematically they are not distortions, as perspectively the picture is absolutely correct. Thus these peculiar features are distortions only in the æsthetic.

When the exposure is made at close range, the following results will be noticeable in all protrait heads, being apparent at a glance even to the casual observer with an unschooled eye,—viz.: The sharpness of the image is usually very irregularly distributed, the definition in itself showing a strong tendency to curvature, especially the protruding parts. As the perspective foreshortening at short range becomes excessive, the important characteristic parts of the sitter will be covered stronger than they should be, which consequently results in a lack of focal definition, and the ofttimes ridiculous enlargement of the prominent features nearest the objective.

This peculiarity is most apparent with the nose, which at the point, in addition to being enlarged, is by the lack of focal definition so spread that the nasal wings are only half discernible. The same conditions are repeated in a more or less modified or aggravated form with the ears, hair, and the contour of the dress or costume.

Then, again, even if the rapidity of the lens or the extreme sensibility of the emulsion permitted a stopping down of the objective until the lack of sharpness be overcome, there would still remain the exaggerated action of an excessive foreshortening. Whereas for a full-length picture the camera is never brought nearer than 16 to 18 feet from the sitter, to obtain a life-size head it is not unusual to advance the lens to within five feet or even less of the

subject. Now unless at least a distance of six or seven feet intervenes it is exceedingly difficult to obtain a satisfactory diffusion of definition.

Further, as a large camera is indispensable for large portrait work, there is but little danger that the lighting of the subject will be interfered with by the increased distance.

In conclusion it will be permissible to call attention to one point rarely touched upon in photographic literature,—viz.: What constitutes a "life-size" head?

To properly understand the term "life-size," it should be accepted in its relation to a full-length figure,—the size of life. Now the true color artist in a case of this kind knows that he must not sketch the figure upon his canvas of the actual size, but somewhat smaller than the original, to such a degree as is prescribed by the well-settled laws of perspective.

The cause for this is that if the figure were sketched upon the canvas in the exact natural proportions, it would, in comparison with any other objects introduced in the foreground of the painting, appear exaggerated, or above life size.

Granted that the same fundamental rules were also applied to these surrounding objects, it would still be necessary for the spectator to retire back from the painting until the figure appeared to recede to the proper dimensions, even though all portions of the painting be mathematically correct.

In reduced pictures, the spectator, on the contrary, has to approach nearer and nearer until the natural point of view is reached, or, as it is technically stated, until the picture has advanced to the proper point.

In viewing large photographic portraits the distance of view for a natural effect is always equal to that of the focal length of the objective used.

Consequently when it is desirable to produce a photographic life-size portrait in all that the name implies, the operator must arrive at a comparative size from the other parts of the body. Although the resultant image will show somewhat of a reduction in the outward contour, the finished portrait will appear of a perfectly natural size, and not, as is the usually the case, colossal or exaggerated.

THE INACCURACY OF DESCRIPTION OF PHOTOGRAPHIC OBJECTIVES BY MANUFACTURERS.

BY W. A. CHEYNEY.*

THIS Society has appointed a committee to inquire into the possibility of adopting a universal standard by which the manufacturers of dry plates may be enabled to mark their goods so that a purchaser will know the sensitiveness of a plate without the necessity of a trial exposure.

Now in order to obtain such a standard, it will be necessary to take into consideration, among other things, the ratio between the equivalent focus of the objective and its aperture; and the purchaser of plates will have to know the ratio as respects the objective that he may be using, or else the marking of the plates will be useless.

The present method followed by the manufacturers in describing their objectives, which seems to be done either in ignorance or with a purpose to deceive, is so erroneous that one must determine the dimensions of the objective for himself, involving no little skill and knowledge, or be led into disappointment and loss that would be avoided if the descriptions were accurate.

We find objectives described at the present time in the price-lists of the manufacturers about as follows:

No.	Size of group.	Size of landscape.	Back focus	Equivalent focus.	Diameter of lens.
X	8x5	6½x8½	7	10	1¾

First let us take into consideration the equivalent focus, which enters into all calculations relative to the capacity of the objective to do a given work in a given time. Here we find 10 inches put down as the equivalent focus of the class of objectives which we are considering, described in the price-list as No. X. Now it is safe to say that out of one hundred objectives, made and classified as having an equivalent focus of 10 inches, not five will have an equivalent focus of that length, and the remainder will vary from 9½ to 10½ inches, or even to a greater extent.

* Read before the Photographic Society of Philadelphia, March 9th, 1892.

The back focus is a dimension that is comparatively unimportant, because the only thing governed by it is the size of the camera box, otherwise it does not enter into any calculation. Still, there is no reason why the figures given on the price-lists should not be correct, or if known by the manufacturers to be only approximate, then let it be so stated. But, as we all know, this is not done, and the statements as to the back focus are as erroneous as are those of the equivalent focus.

Next we have the diameter of the lens. And while the measurement may be correct as respects the diameter of the glass, yet it is deceiving, from the fact that while with one lens the cell which holds it does not lap over the edges of the lens more than 1-32 of an inch, in another it will lap as much as ⅛ of an inch, or even 3-16 of an inch. In this way the working aperture of the lens may vary as much as 5-16 of an inch, while the diameter of the lens will remain constant. This being the case, why not give the *working aperture* correctly instead of a dimension which is so variable that it is only misleading?

As to the size of the plate that the objective will cover sharply when open to its largest aperture, and that which it will cover when "stopped down" with its smallest diaphragm, we will not discuss, for what seems to be "sharp to the corners" to one person does not seem so to another. This difference of opinion arises largely from the use to which one or the other puts the negative obtained with the objective, for he who wishes to enlarge will naturally be more particular than he who wants to reduce; and it is also governed to a great extent by the eyesight of the persons. As to this dimension of the objective, would it not be better to give the diameter of the circle covered sharply, rather than the size of the plate?

To cure these errors, it is only necessary that the manufacturers shall state that the dimensions of the objective given on the price-lists or catalogues are only approximate, and to send with each objective a certificate setting forth the correct dimensions, over the signatures of the manufacturers. This is not only due to the purchaser, but is also *a protection to the manufacturer who makes a good objective.*

But the manufacturer says that photographic objectives are not instruments of precision. If they are not, then we are paying too much money for them, and all the talk about the necessity for accurate calculation of curves, accurate centering, etc., goes for nothing. And it will be useless for engineers to endeavor to use photography in making topographical and other surveys, where an error of an instrument would be multiplied a thousand times.

The manufacturers to the contrary—a photographic objective *is* an instrument of precision, and as such should be accompanied with a certificate of its exact dimensions.

Thus far we have been dealing with those dimensions which are set forth in the catalogues; but we now come to a dimension not so stated, which is as important in any calculation for accurate work as that of the equivalent focus, and is generally expressed in its ratio to the equivalent focus,—namely, the aperture of the objective, or, in other words, the diameter of the diaphragm.

With each objective there is a set of diaphragms, either detached, rotating, or iris, which are usually marked *f-4*, *f-8*, *f-16*, down to *f-64*, and these marks should mean something. But they do not, for in most cases they are erroneous and are not the fraction so stated, either of the equivalent focus, as given in the manufacturers' catalogues, or of the true equivalent focus of the objective.

In the case of a certain objective, where the equivalent focus given in the catalogue was 8½ inches, the true equivalent focus was 9 inches, the diaphragm marked *f-8* was ⅞ of an inch instead of 1⅛ inches, and all the other diaphragms were wrong in the same ratio of error. This is not an isolated case, but is the rule rather than the exception.

Now this proceeding on the part of the manufacturers of objectives is an insult to the intelligence of all photographers, whether professional or amateur, and is a degradation to photography. Therefore it is our duty as a society and as individuals to protest against such inaccuracy, and we should by all means in our power endeavor to put an end to this "Rule of Thumb."

Finally, there is one dimension that should be marked in some way upon every objective, namely, the optical center of the

objective. This is never done, and often leads to error in enlarging and copying, for in both of these operations the measurements should be made from the optical center of the lens or combination of lenses, as the case may be. As this is a difficult point to determine, would it not be well for the manufacturers to mark all objectives as follows:

In the case of a combination, to run a line around the barrel so that the center of a circle thus drawn coincides with the optical center of the combination, and to mark the line as follows, "The center of this circle is the optical center."

And in the case of a single lens, to put in the certificate that the optical center of the lens lies in the axis (so many inches) in front of the anterior surface, or (so many inches) back of the posterior surface of the lens.

Cheyney, Pa., March 9th, 1892.

PHOTOGRAPHIC NAMBY-PAMBYISM.

WALTER D. WELFORD.

OH that I had the blunt, outspoken, fearless speech of a P. H. Emerson, or the scarcastic ridicule of a G. R. Sims, that I might the better denounce the insidious foe to photography now so rapidly creeping upon us,—namby-pambyism. It is to be met at all turns, whether amongst our societies, in our meetings, our exhibitions, or in the press. When I say that it exists principally amongst the amateur ranks, it is with no intention of raising up the professional as a bright and shining example. Professionals as a body are too jealous of each other and everybody else to come close enough into contact with their fellow-men to give any opportunity to namby-pambyism,—the only exception to this being shown at exhibitions.

Let us go to a club or society meeting. The president, perchance a local magnate, knowing but the merest outline of photographic work or technique, occupies the chair. Listen to the pretty little sentences: "Our estimable honorable secretary will

read the minutes," or "Our good friend and earnest worker for this society, the honorable treasurer, will next kindly allow us the privilege of seeing his holiday prints." Next, in return, the honorable secretary assures the meeting that the presence of the genial president "is a guarantee in itself of a thoroughly enjoyable evening." How diffident everyone is to everyone else,—"my dear friend this," or "the clever worker" that. No speaker is in error; you merely "cannot agree entirely with his remarks." He may be dealing with a subject with which he is absolutely unacquainted, but you polish the edge of the reply, and say, "I think, though I may be wrong, that the popular member who has just spoken has met with a different experience from others." Perchance one of the rank outsiders, timidly addressing the chair, inquires humbly why the resolution as to notices of meetings has not been carried out? The president, with a beaming smile, rises to assure him how earnestly and thoroughly the honorable secretary does all the work, and with a few platitudes strokes the questioner down the right way, brings in a few sweet nothings about the talented officers of the society, and sits down beaming upon all around, such a perfect embodiment of complete satisfaction and geniality that the outsider wishes he had not troubled so nice a man. What is all this? Is it business? No, namby-pambyism.

Then comes a lantern lecture, some well-known official of another society, probably, being introduced with a few words as to his ability, knowledge, and general good-fellowship. He is of necessity a very dear friend of the president, though they may have never met before. During the course of the lecture you will hear weak attempts at puns, sentimental little quotations from the poets about the fair sex whenever the chance occurs, how much your society is thought of by himself, what a splendid president to have at the head of the society, and how well the lantern is being handled. He is simply overwhelmed with delight at being present, especially when so many ladies—"ah! the dear creatures"—are present. Some are young, too, and so pretty that if he were not such an old man now, he really thinks, nay, is almost sure, that he should have lost his heart that evening. Notice with what care he works in kind little inanities about the

various officials, especially, perhaps, the one whose hospitality he is enjoying. Is this an instructive lantern exhibition? Certainly. An exhibition of namby-pambyism.

Now let us visit a large photographic exhibition. See the efforts to make a fine buxom country lass appear as though in the deepest sorrow, beside a cradle with a doll in it. What is the title?

> "For well may she weep when her babe is gone,
> As the light fades from the sky."

Is there anything impressive about the picture? No; it merely excites wonderment at the simplicity of the artist, who imagines that from every-day accessories he can with his camera conjure forth the deep expression of grief. If sorrow and death be too deep for words, what chance has the mechanical operation of photography to succeed? Next to this frame probably is one of a pretended mourner at a tombstone, or a pretty-faced girl upon a couch, entitled "Gone." What is gone? The sense of the man who sent such a subject to a public exhibition. Is it sentiment? Is it art? No; it is sickly namby-pambyism.

Take up one of our photographic periodicals. Why, because some man has at one time taken a prize in a competition,—why do we ever after praise his work, his wife, his house, his business, his social position? We refer to workers as "old friends," energetic officials, and so on.

We are sure to find references to some one who has done us a good turn at some time or other by asking us to tea, when other people and other matters are neglecled. His pictures are criticised (sic) at an exhibition fulsomely, whilst others are not even mentioned. We waste columns upon reports of our own doings, record the nice things said about us, how nice we are and what clever editors. Is this journalism? No; it is namby-pambyism.

Stamp it out, tread it under foot. Let us have a more sturdy, vigorous, common-sense life. Discard it, destroy it, for it is a reptile. We want more free, outspoken bluntness, not forgetting to value the opinions of others, but dealing with everything that comes before us with a manly English straightforwardness.

Namby-pambyism is hypocrisy and toadyism, a creeping, unclean thing. Kill it!—*Photographic Review of Reviews.*

A HISTORIC LANDMARK.

BY CHARLES H. MILLER.

CHEW HOUSE, Germantown, Philadelphia, Pa., was erected in 1762 by Chief-Justice Benjamin Chew, a lawyer of the Middle Temple, London, a descendant of Colonel Samuel Chew, of Chewton, in Somersetshire, England, who settled with Lord Baltimore in Maryland in 1671.

Benjamin Chew held several important offices in the old province, and was Chief-Justice of the Supreme Court before the Revolution. Although a friend of Washington and other prominent patriots, his fidelity to the American cause was much doubted, and he was imprisoned at Burlington with John Penn and others until 1788. After the Revolution, however, he was appointed by Governor Mifflin, President Judge of the High Court of Errors and Appeals.

The name given to the estate by Judge Chew was Cliveden, a title which seems to have early fallen into disuse. As Chew's House it was known when Washington's forces advanced against the troops of Lord Howe on the eventful 4th of October 1777.

In the retreat from before Wayne's troops, who were advancing down the Skippack Road (Main Street), which at that time ran through the centre of the village and was bordered on each side by peach trees and a row of houses, Colonel Musgrave, with six companies of the Fortieth Regiment, succeeded in getting possession of the Chew House.

While Wayne, with the advancing body, continued to pursue the retreating British through Germantown, the remainder of the American troops were brought to a halt by Colonel Musgrave. This officer had barricaded the doors of Chew's House, and from his light infantry kept up a murderous fire upon the pursuers. A discussion now took place among the American officers; some were in favor of storming the house, and others were opposed to the consequent delay. General Reed was for pushing on. General Knox of the artillery however contended that it was contrary to all military precedent to leave "a fort," possessed by the

enemy, in the rear. "What!" exclaimed Reed, "call that a fort, and lose the happy moment?" Knox's opinion, nevertheless, prevailed; and that everything might be done according to the "rules of war," it was determined to send a summons to the commander of the fort "to surrender." A youth was therefore sent with a flag in due form; but had no sooner reached within musket range than he was shot dead.

The artillery was now brought up, but even cannon balls proved ineffectual. Attempts were at last made to set fire to the house. Some with bundles of straw, and others with firebrands of pine-wood, made their way amid a shower of bullets to the lower part of the building, where they strove to effect their purpose. (The corner at the left of the picture is where a young Virginia lieutenant was shot dead while trying to light some straw he had placed against the side of the building. The mark of the bullet which struck him and glanced off is still seen upon the stone.) But Musgrave's men were on the alert, and, getting in the cellar, shot down each man before he could accomplish his object. A half hour was thus lost in these vain efforts to carry out Knox's formal tactics, and the rear of Sullivan's division was prevented from that aid to General Wayne which might have proved of effective service. At that time a new addition was being added to the rear of the house which was only half completed. It being a very foggy morning Washington, who accompanied Wayne's division in person, mistook it for breastworks thrown up by the British, and led him to believe that a large force was concealed behind it.

The house is now occupied and owned by Miss Chew, an old lady of 87 years of age, who is a direct descendant of Benjamin Chew, being his granddaughter; and the last of a family of thirteen children.

The house was, of course, much damaged; but, on the whole, stood the siege with credit to its builders.

It was so battered that it took four or five carpenters a whole winter to repair the fractures. The front door, which is still preserved, was full of shot holes. Every room was bespattered with blood, and the walls riddled with bullets, which still can be seen. One six-pound shot, which came in at the front window, passed

A HISTORIC LANDMARK.
THE [illegible] HOUSE, [illegible]TOWN, PENNA.

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A HISTORIC LANDMARK,
THE CHEW HOUSE, GERMANTOWN, PENNA.

NEGATIVE BY
CHARLES H. MILLER, PHILA.

through four partitions, and then out of the back of the house.

The fight, which lasted all morning, was fought all along the Skippack Road (Main Street) as far down as Wayne Junction, and the houses on each side, many of them still standing, bear marks of the battle. The Haines house, which is lower down the street, was used as a hospital for those soldiers whose wounds demanded immediate attention, and is now occupied by the descendants of that family. It was built by Dirk Johnson.

For historic and other reasons the Chew House is one of the most interesting, and, except Mount Vernon, perhaps the most notable private residence in the country.

THE FIRST NOTICE OF ALBUMENIZED PAPER FOR PHOTOGRAPHIC PURPOSES.

THE following paragraph records the first application of albumen to photographic purposes; it originally appeared in the *Athenæum* of London, and it was reprinted in the *Journal of the Franklin Institute*, of Philadelphia, for the year 1839,—viz.

PHOTOGENETIC DRAWING.

Considering that any (however trifling) improvement will not be unacceptable to those of your readers who feel an interest in this art, I have been induced to communicate the following method of preparing the paper, which, after many experiments, I find to succeed best. Wash the paper with a mixture of equal parts of the *white of egg* and *water*, afterwards with the solution of *nitrate of silver*, fixing the drawing as usual with the *iodide of potassium*.—H. L.

Little did this unknown experimenter know that in a little over a decade his invention would expand into an important industry, and that others would claim and reap the benefits of his discovery.

The introduction of albumenized paper for photographic purposes is usually credited to Fox-Talbot, notwithstanding that a Frenchman, Le Gray, mentioned it in his work published as early as 1850, just eleven years after the above publication in London.

It would be interesting to know the identity of this original inventor of the albumen process,—perhaps some of our English contemporaries can lift the veil, so that credit may be given to whom it is due.—J. F. SACHSE.

M. MATHET'S ORTHOCHROMATIC PHOTOGRAPHY.

XANTHUS SMITH.

WE are in receipt of an admirable treatise upon orthochromatic photography, under the title of "Guide Pratique pour l'emploi des Surfaces Orthochromatique, leur application a la Photographie des Objets Colorés." The work is by M. L. Mathet, Chemiste, Pharmacien de premiere classe. Published by the Société Générale d'Éditions, 24 Boulevard St. Germain, Paris.

That M. Mathet is an enthusiast in this particular branch of photography is evident from the thorough and painstaking way in which he treats of the various nice details to be attended to in order to attain very successful results in the reproduction of true color values by photography.

As the volume comprises more than eighty pages of matter, it would be out of the question to translate it for the benefit of our readers, as we might an ordinary pamphlet article, but as orthochromatic photography does not seem to be practiced here with that thorough attention to details which is required in order to approach the best results, we will give a brief outline of the contents of the book, more as a matter of interesting some of our readers in the subject than of instructing them, as we would be glad they should be instructed by a careful reading of the book.

M. Mathet, after speaking of the introduction of the art in 1882, and regretting that it has not been more generally practiced in France, owing to a fear of the complications of the process on the one hand, and a failure to attain success through careless manipulation on the other, goes on to lay great stress upon the necessity for using colored screens in addition to the orthochromatically prepared plates. The screens must not only be of different colors, but there should be at least four different shades or depths of each color. For instance, in copying a water-color drawing or painting in direct sunlight a screen of great depth of tint should be used, whereas in copying the same work with the same conditions of plates, lens, etc., in a feeble gray winter light the palest or weakest screen should be used. The light of oil-

lamps or gas is of the same character as the feeble diffused light, requiring the slightly colored screen, while the electric light is more of the character of sunlight, and needs a highly-colored medium. Different pigments of the same color have very different actions,—as in the yellows, Naples yellow is far more actinic than chrome yellow.

The screens for interposing may be of glass or of pellicles of gelatine or collodion colored with aurantia to correct the yellow, and with rhodamine or erythrosine to correct the red. The author goes nicely into the details of the preparation of these screens. They should be perfectly even in tint, and free from striations or inequalities of surface, and are used to the best advantage when arranged so as to be inserted in the barrel of the lens in the same manner that stops are used.

A plan suggested as a convenient way of using a great number of tints, and changing them quickly, is to secure two perfect sheets of plate glass together on three sides, leaving a small intervening space, which may be filled with colored solutions kept in bottles, the solution being emptied into the screen and returned to its respective bottle after use. This plan would seem to be better suited for studio work than for out-door photography.

In the portion of the work treating of the plates to be used, the author says that amateurs generally will prefer to use the orthochromatic plates furnished by the plate-makers, but for such as may prefer to orthochromatize the ordinary dry plates of commerce, which is very easily done, the following will be found the best treatment:

A great number of substances have been suggested, and have been found to give successful results to a greater or less extent, but M. Mathet's experience is that for the correction of yellow and green, rose of Bengal, erythrosine, erythrosinate of silver, and red of quinoline have decided preference,—and more especially is the erythrosine recommended on account of the greater sensitiveness of the plate subject to its treatment.

Violet methyl is a sensitiser for red, but the most perfect sensitizer for the red rays is cyanine or blue of quinoline, which has this disadvantage for use, however, that it dces not hold its color

in solution. The alcoholic solution will retain its color for a few days only in the light, but when kept in absolute darkness, the author has preserved it for more than two years.

The substance which seems to be the most practically useful is chlorophyl. It was one of the first experimented with in the making of orthochromatic plates, and possesses a high degree of sensibility for red. It has this disadvantage, that it must be freshly prepared. The following method is given for its preparation: Take fresh myrtle leaves, cut them in fragments, cover them with ninety-five per cent. of alcohol, and heat over a lamp for twenty minutes, stirring all the while,—not letting the temperature rise above 60° C. Allow to cool, and filter. The resultant greenish liquid is the chlorophyl. It will keep for some time in a well-stopped bottle, but should be carefully shielded from the light.

The iodo-bromide plates give better results when sensitized for color than the bromo plates. The former are to be distinguished by taking a fragment of the plate into the sunlight, when it will be found to have a decidedly greenish-yellow cast. The tint must be judged of immediately on exposing to the light. Care should be taken to employ plates absolutely free from disposition to fog.

The quantity of coloring matter required for the bath is small, —about 1 grain to 500 cc. of water or alcohol, if the substance is not soluble in the former. It is recommended to insert the plate in a weak solution of ammonia (2 cc. to 200 cc. of water) in order to make it receive more quickly and equally the coloring bath. The disposition which this alkaline bath would ordinarily have to fog the plates, is, it seems, entirely corrected or removed by the subsequent bath of erythrosine, eosine, or quinoline red, as the case may be.

The bath for plates sensitive to yellow and green is as follows:

Distilled water	190 cc.
Ammonia	5 cc.
Aqueous solution of erythrosine at 1-500	12 cc.

For yellow, orange, and orange-red:

Alcoholic solution of quinoline at 1-500	8 cc.
Alcoholic solution of cyanine purified with chloral at 1-500	1 cc.
Water	200 cc.
Ammonia	2 cc.

The bath to sensitize for red is composed of:

Cyanine solution at 1-500	6 cc.
Distilled water	250 cc.
Ammonia	4 cc.

The ammonia to be added last. The ammonia is to augment the rapidity of the plates, which would otherwise be greatly retarded by the cyanine, and the cyanine treated with chloral as used in the preceding bath is to preserve the cyanine, which otherwise decomposes rapidly.

The plates are dipped in the sensitizing bath and allowed to remain from sixty to seventy seconds, the author says, then drained and washed slightly in a bottle of distilled water, after which they are to be drained in a nearly vertical position on thick pads of blotting-paper, and subsequently dried without artificial heat in an absolutely dark room. They will dry in three or four hours, under ordinary circumstances—in summer in less time—but under unfavorable conditions a carefully-arranged ventilation should be constructed, connecting with a chimney, or admitting of the use of a lamp, so as to cause a current of air without danger of leakage of light. If the plates should be too long in drying, they will be sure to yield fogged, spotted negatives, of unequal density.

M. Mathet is enthusiastic over the very superior results obtained by the use of orthochromatic plates in taking flowers and objects of vertu, for portraiture, and for copying paintings, water-color drawings, and maps and photographs, and especially in the difficult branch of copying oil-paintings, manuscripts, etc., yellowed by time. He says that even in the case of a drawing made with blue ink or crayon on a yellow ground, excellent results may be obtained.

In the use of orthochromatic plates in landscape work, especial attention is required to the nature of the subject, the lighting, and the proper adaptation of screens, because the brilliant lighting of the sunshine, rich in yellow rays, contrasts so violently with the deep shadows, and so many complications arise from the cool bluish reflected light amongst the shaded portions in either street scenes or wood scenes, or in the case of white buildings amongst foliage, that unless screens of the proper color and depth are used little advantage is to be gained over the ordinary dry plates. It would seem that the best results are to be obtained when the sun is somewhat obscured in taking out-door scenes.

In regard to the development of the orthochromatic plates, the author says that it is absolutely the same as that employed for the ordinary bromo-gelatine dry-plate, and that the photographer is free to use whatever may be his favorite mode, except perhaps that the ferrous-oxalate development will not give such brilliant results as obtained with pyrogallic acid, hydroquinone, or eikonogen; and further, in regard to the development, the lighting of the dark room requires especial attention. It is recommended that a lamp should be used in a lantern, the latter being so constructed that different colored sheets of glass may be inserted to suit the differently sensitized plates to be developed. In developing plates sensitized for yellow, two sheets of ruby glass,—one ground, the other plain,—should be inserted, and also one of cathedral green. For red, two sheets of green should be superimposed with yellow. The author says that he has found ruby and green glass always a much safer and more agreeable light to work by, and less fatiguing to the eyes, than the yellow light so universally employed. During development the plates should be as little exposed to the light as possible, a card being kept over the tray, and raised occasionally to watch the progress of the development.

M. Mathet's work is illustrated with four photographic landscape views, which demonstrate very well the advantages of the orthochromatic plates.

GLEANINGS FROM AN OLD SCRAP-BOOK.

BEFORE THE AMATEUR STALKED FORTH ABROAD IN THE LAND.
CLIPPED BY HISTORICUS.

THE following extracts from our old scrap-book will form interesting reading at the present day. They will prove a revelation to the present generation, while such as have been hewers of wood and drawers of water in the photo field before the present generation with their hand cameras and dry plates appeared upon the scene, will recall the sensation made when Langenheim's views on paper first appeared.

Langenheim—who was Voigtlander's brother-in-law—came to Philadelphia during the forties, and for several years was the leading photographer, not only in Philadelphia, but probably in the world. He introduced the stereoscope in Philadelphia, and, if we mistake not, made the first lantern slides by the aid of photography.

The editorial about interiors will speak for itself, while the application of magnesium as early as 1866, with the resultant "Pistolgraph," will prove a photographic curiosity.

MINIATURE PORTRAITS BY THE MAGNESIUM LIGHT.—Every one, says an English journal, is now familiar with the agency of the sun in taking the most exact pictures of natural objects. Mr. Skaife, of 118 Pall Mall East, has been successful in applying to the same purpose, and especially to human portraiture, the magnesium light. The apparatus which he calls the "Pistolgraph" has been in use by him for some years, but it is only lately that he has combined with its powers this new and marvelous light, the nearest artificial approach to that of the sun. Practically, it is found to give increased facilities for the exercise of artistic taste by the operator, and the portraits obtained are free from stiffness and other defects which often attach to ordinary photographs.

The "Pistolgraphs" obtained are medallion portraits. They are taken on glass, and the picture being then placed between two plates of glass and subjected to a certain heat, the whole becomes one hard homogeneous substance, suitable for setting in a locket.—*Presbyterian, February 10th, 1866.*

LANGENHEIM'S NEW SERIES OF AMERICAN STEREOSCOPIC VIEWS.—We, the undersigned, who by subscribing and furnishing F. Langenheim with the means to commence a new series of American stereoscopic views between Philadelphia and Niagara Falls, have received the number subscribed for, and take pleasure in expressing our entire satisfaction with them, and would recommend them to all who have a desire to cultivate a taste for their own American works of art and skill. They are also colored with much taste and truthfulness to nature.

John Tucker,	Thomas C. Kirkbride, M.D.,
R. D. Cullen,	Samuel Sloan,
H. J. Williams,	J. C. Cresson,
Charles Vezin,	Lyon J. Levy,
James Farnum,	Joshua Baily,
James R. Graves,	Samuel Mason,
M. J. Lewis,	Jeremiah Hacker,
C. Gulluc,	Thomas C. James,
J. H. Towne,	James L. Clayborne,
Fairman Rodgers,	Charles C. Grugan,
M. L. Dawson.	

A CARD.—The new series of American Stereoscopic Views alluded to in the above testimonial were taken in company with the subscriber upon a recent trip to Niagara Falls, along the south route of the Reading, Catawissa, Williamsport & Elmira Railroad to the Falls, with the addition of about twelve very interesting views of scenery in the coal regions near Pottsville and on the Mine Hill Railroad.

These pictures are soon to be published upon glass and porcelain by an entirely new process. They are also to be published in a cheaper form upon albumenized paper, and may be had at the publication office of

WILLIAM LOYD, 188 CHESTNUT ST., PHILA.

THE paper views will be sold in book form, and ready for sale on Friday at Cowperthwait & Co., under the Masonic Hall, and Parry & McMullan, Fourth and Chestnut.—(*December, 1855.*)

EDITORIAL IN *Banner of the Cross*, Dec. 13th, 1860.—We have long wondered why, seeing photography has attained such perfection, that our city churches have not been represented, and the members of different congregations furnished with what many of them would value so highly, a representation of the old familiar pulpits and

desks and fonts and chancels. In the midst of our questionings, we were delighted to see that the Messrs. McAllister had carried out this suggestion, and are now ready to furnish the public with beautiful photographs of the interiors of most of our city churches. We have much to say about some of them; but our limits forbid our doing so in the present issue.

We content ourselves, therefore, for the present, with referring our readers to the advertisement of the enterprising firm in our columns, reserving comments to a future occasion.

[The advertisement merely sets forth the names of nine churches, and that each view is accompanied with a description of the church, a brief historical account of the parish, succession of rectors, etc. Price, each view, plain, 25 cents; colored, 38 cents. Sent by mail free of charge.—ED. *A. J. of Photo.*

THE STEREOSCOPE.—Sir David Brewster, inquiring into the history of the microscope, finds that its fundamental principle was well known even to Euclid; that it was distinctly described by Galen one thousand five hundred years ago; and that Giambatista Porta had in 1599 given such a complete drawing of the two separate pictures as seen by each eye, and of the combined picture placed between them, that we recognize in it not only the principle but the construction of the stereoscope. —*Ledger, July 12th, 1860.*

G. W. Collamer, one of the best known photographers in Wilkesbarre, Penna., died on January 29th, in the sixty-third year of his age after an honorable business career of twenty-seven years. Mr. Collamer was born in Montpelier, Vermont, June 29th, 1830, and, after graduating at the University of Burlington with honor to himself and his alma mater, came to Pennsylvania and began teaching school. Not finding it congenial, and having a natural love for the beautiful in nature and art, he decided to become an artist, and for forty years followed his chosen profession, twenty-seven of which were passed in this city. His courteous manners and sterling integrity endearing him, alike to his family, friends, patrons, and the entire community.

Our best successes are built upon a foundation of failures.—*Ram's Horn.*

A PHOTOGRAPHIC FEAT.

A PHOTOGRAPHIC feat was lately accomplished, which, for the number of plates exposed within a given time, and considering the difficulties, it is thought, breaks the record.

During the last month a curious old document, the proceedings of the first Freemason's Lodge in America, came into the temporary possession of the Historical Society of Pennsylvania. It was desirable that a copy should be made of the book, which consisted of 106 closely-written folio pages. The time being short it was concluded to photograph the entire book page for page. The limit of time was two days, the work having to be done in the fire-proof building of the Historical Society, where no facilities for copying or changing plates were at hand. The light was also poor, as the windows were narrow and high from the floor.

The task was, however, undertaken by one of the members, who is also a member of the Photographic Society. An ordinary 5x7 camera was used. On the first day almost an hour of valuable time was lost in getting ready, and it was not until 12.30 p.m., February 17th, that the first slide was drawn. By 3.30, when the light had become too weak to work, forty-two plates had been exposed, ten plateholders having been used. On the next day the task was resumed with sixteen plateholders, sixty-four plates being exposed between 11.18 a.m. and 3.30 p.m. The total time for exposure and focusing, exclusive of the time lost in changing plates averaged about three minutes per page, the task being done without any assistance.

When the plates were developed the result showed that all of the 106 plates were good and serviceable,—there was not a failure in the lot. This in itself is a remarkable fact, on account of the number and the uncertain light in the confined quarters.

The plates used were Carbutt B, bought at three different places, and consisted of four emulsions: Lens, Ross portable symmetrical 7-in., focus *f*-22.6; exposure 90 to 120 seconds; development, hydro and eikonogen combined, also rodinal 1:20.

In the Dark Room.—Edwin (amateur photographer)—That's it! Another plate spoiled. Angelina—What spoiled it? Edwin—The light of your eyes. P. S.—Engaged.

The Editorial Dropshutter.

The New Orleans Camera Club.—Carnival days in the Crescent City brought with them many a rare and beautiful gathering. That at the Camera Club rooms was one of the daintiest. Every one who loves the delicate art of photography knows that No. 3 Carondelet street is the Mecca of its devotees. They came from all parts of the city. There were young men and old men, and femininity lent the charm of her presence to grace the scene.

The spacious and beautiful apartments in which the club is domiciled were at an early hour thronged nearly to suffocation. It taxed the committee in charge to manage the crowd; but they succeeded admirably in caring for the large number present.

During the evening the following prizes were awarded, viz.—For the most artistic "silver print," one medal to Mr. C. A. S. DuQuesney; for the best "platinotype," Mr. Paul Reynes; for the finest "transparency," to Mr. Horace Carpenter; and for the best general exhibit, to Mr. S. L. Mitchell. The honorably mentioned were Messrs. R. H. Palfrey and S. F. Lewis, and Mrs. J. C. Kendall, of Norfolk, Ct. The announcement of the awards was received with applause. The exhibition remained open for several days, a well-deserved honor.

Captain Pizzighelli, in the *Photo. Correspondenz*, agrees with the statement published by Londe in the *Bulletin de la Société Française*, that notwithstanding the great actinic power of Blitz-pulver, the comparative period of combustion is still not rapid enough to meet the present demands of the photographer. Further, that all experiments should be conducted with the object in view, looking towards the discovery of a still more rapid burning Blitz-pulver, which would make the instantaneous shutter a superfluity.

The following bit of photographic information hails from the Fatherland, and is characteristic of the peculiar terse style in vogue among certain classes of German journalism.

"With much pleasure we announce the return of the *Wellborn Herr geheimer geheim regierungs rath*, Isidore Cohensohn, member of the *Unabhängigedeutschelichtbildnerischleiebhabergeselschaft*, from a *photographischeausflugt* to the Levant, during which Herr Cohensohn succeeded in obtaining an admirable negative of a *Constantinopolitan-*

ischerdudelsackspfeiffer. The exposure was made with a *Duplex-geheim momenthandapparat-wechselvorrichtungsystempasquarelli,* upon a *Dünngegosseneorthoskiagraphischebromsilbergelatinetrockenglimmerplatte.* The development was successfully accomplished with the new *Para-amidophenolnatronsulphitkohlensaureskali* solution, the image coming up quickly with the requisite density. Enlarged prints from the negative were exhibited at the late meeting of the Liebhaber Verein, and attracted universal attention on account of the beautiful enamel upon the surface, which Herr Cohensohn stated had been obtained with an ordinary *Dilettantenphotographensatinirmaschine,* by the use of a small quantity of *Echtafrikanischekalterpresstecoconussoehlschwim Seife.* By a unanimous vote of the club the *Vergoldetealuminumehrenmedallie* "Vogelheim" was presented to Herr Cohensohn.

A correspondent writing to the *Scientific American.* asks: "Is there any chemical sensitive to the action of gaslight? that is, is there any chemical, perfectly invisible in yellow or red light, which will darken on exposure to the light of a gas jet? I want to prepare thesur face of a blank sheet of white paper by tracing or drawing thereon some drawing or picture which will burn and char the surface of the paper, leaving a black design on the paper. I have tried saturating with saltpetre, but it burns the paper through, and is too slow, and have tried a preparation of sugar and chlorate of potash, ½ chlorate of potash to 1 pint sugar, both pulverized; it will burn a few inches, then go out. I prepared the paper by going over it with mucilage with a camel's hair brush, and carefully dusting over the powder, and have tried making a paste out of the sugar and potash, and painting it on, but it would not work. How can this be done? The powder must be white. I want a chemical, colorless, that will turn black on application of another; for instance, if I draw a design on a sheet of paper with a colorless solution of some chemical, I would like to bring it out with another one, and would like to know what will destroy the color then produced. I have a few good receipts on that subject which work very well, but would like to improve. I use chloride of iron and gallic acid, using the acid as the base and the iron as a developer, and can destroy the color with oxalic acid in solution. Now is there any color that oxalic acid will bring out, which chloride of iron will not? The effect I wish to produce is to go over the paper with a colorless solution of two different chemicals, and having two different designs or pictures on the paper already prepared, and by going over it with one developer one of the pictures will appear, and then by going over

the same paper again with a second developer to bring out the second picture; which has remained, and at the same time destroy the first picture produced. I have come very near accomplishing the above, and can do it with solutions in glasses, but they won't work on paper.

The writer fails to add what would be of the greatest interest, viz.: the purpose for which he wishes to apply the process or information.

We are in receipt from Fr. Gutekunst of a photographic panorama (32x9½ inches) of the harbor of Philadelphia, showing the river islands now being removed by the United States Government. The print is entirely free from converging lines or distortion. Particulars and a full description will appear in our next JOURNAL.

A New Toning Bath.—John R. Clemmons, whose salted plain paper is a household word with all photographers, has lately been experimenting with the salts of aluminum and their application to photographic purposes, one of the results being a formula for a toning bath giving extraordinary results upon both plain and albumenized paper, as was demonstrated at the late meeting of the Photographic Society, the prints showing clear whites and a remarkable detail in the shadow. The composition of the bath is as follows, viz.:

Chloride of aluminum	20 grains.
Bi-carbonate of soda	85 grains.
Water	12 ounces.

For use add gold sufficient to tone in 8 to 10 minutes. Abou ½ ounce of gold solution, 1:15, being sufficient for two sheets of paper. The fixing bath is made of:

Hypo	2 ounces.
Water	12 ounces.

Prints will fix in about five minutes. A great advantage of this toning bath is that when prints are put in the hypo there is but a slight change in the tone.

An apparatus for affixing adhesive stamps has been patented by an Australian. The stamp-receiver is supported by the upper end of a pair of pivoted arms. Another pair of pivoted arms support a damping-roller at their lower ends. A knob or handle causes the damping-roller to travel over the service of an envelope, etc. A plunger, fitting loosely within the stamp-receiver, is pressed down upon them. The mechanism works in conjunction, the stamp being moistened and affixed.—*Paper and Press.*

Photographic Hints and Formulæ.

Aristotype Formula.—The *Scientific American*, in reply to a correspondent who asked for the best formula for toning, fixing, mounting, and burnishing aristotypes, prints the following formulas, viz.:

A better mounting paste than starch for aristotype prints is:

Nelson's No. 1 photo. gelatine	4 ozs.
Water	16 ozs.
Glycerine	1 oz.
Alcohol	5 ozs.

Dissolve the gelatine in warm water, then add the glycerine, and lastly the alcohol. This is said to prevent cockling. Alum should be used in the toning and fixing solution to harden the surface. A combined touching and fixing solution is made up as follows:

1. Hypo	10 ozs.
Add water to make	36 ozs.

When dissolved add 4 ozs. of powdered alum.

2. A. Sulphocyanide of ammonia, c. p.	1 oz.
Dissolved in water	2 ozs.
B. Dry chloride of gold, c. p.	15 grains.
Chloride of ammonia	60 grains.
Dissolve in water	2 ozs.

Add B to A in small portions, shaking after each addition till the precipitate formed is redissolved, then filter. The solution should be clear and colorless, and be kept in a yellow bottle.

3. Nitrate of lead	90 grains.
Water	2 ozs.

Different tones can be made by various combinations of the three solutions.

Warm tones.	No. 1	2 ozs.
	No. 2	2 ozs.
	No. 3	2 drachms.
	Water	6 ozs.
Purple tones.	No. 1	8 ozs.
	No. 2	3 ozs.
	No. 3	4 drachms.
	Water	5 ozs.

Cold tones.	No. 1	8 ozs.
	No. 2	4 ozs.
	No. 3	4 drachms.
	Water	4 ozs.

The bulk of the solution may be lessened by using one-half or one-quarter the proportions above stated. After the prints are dry, and before burnishing, rub the following lubricator over the surface:

Cetaceum (spermaceti)	10 grams.
Castile soap	10 grams.
Alcohol	1 kilogramme.

This will give a good gloss.

Wood-Pulp as Absorbent.—For the purpose of rapidly drying filters and various preparations, discs or plates of wood-pulp are recommended by Paul Hartmann. These discs may be coated with cellulose, whereby they become smoother. They soak up liquid more readily than plates of clay or gypsum.—*Zeitsch. Anal. Chem.*

How to Loosen Glass Stoppers.—*The Pottery and Glassware Rep.* states that some one of the following methods is certain to prove effective.

1. Hold the bottle or decanter firmly in the hand or between the knees, and gently tap the stopper on alternate sides, using for the purpose a small piece of wood, and directing the stroke upward.

2. Plunge the neck of the vessel in hot water, taking care that the water is not hot enough to split the glass. If the stopper is still fixed, use the first method.

3. Pass a piece of lint around the the neck of the bottle, which must be held fast while two persons draw the lint backward and forward.

4. Warm the neck of the vessel before the fire, and when it is nearly hot the stopper can be removed.

5. Put a few drops of oil around the stopper where it enters the glass vessel, which may then be warmed before the fire. Then apply No. 1. If the stopper still continues immovable, repeat the above process until it gives way, which it is almost sure to do in the end.

6. Take a steel pin or needle and run it round the top of the stopper in the angle formed by it and the bottle. Then hold the vessel in your left hand and give it a steady twist towards you with the right, and it will very soon be effectual. If this does not succeed, try proc ess No 5, which will be facilitated by it.

The Rodinal Developer.—Dr. M. Anderson, to whom we are indebted for the introduction of the new rodinal developer, indicates in the *Deutsche Photo-Zeitung* that the commercial concentrated rodinal solution contains, besides neutral sulphite and water, only an alkaline salt of paramidophenol, no excessive caustic alkalies. As to the keeping qualities of the solution he states that it keeps well, not only in bottles filled up to the neck, but also in bottles which are but partly filled with it. If, in the latter case, the solution becomes in time darker, this will be practically of no importance. If diluted with water the developer will, however, not keep for any long time. Should it be desired to preserve the diluted solution for a longer period, it should be diluted with a solution of neutral sodium sulphite (of from 5 to 10 per cent.) instead of water. A small quantity of a white salt will be precipitated out of the concentrated rodinal solution after some time, but the energy of the developer will not be influenced by this deposit. The rodinal solution containing but traces of alkaline carbonates, it is not necessary to use distilled water for diluting it. If diluted to a slight degree with from ten to twenty times its bulk of water for instance, the rodinal developer works very energetically with plenty of contrast, whilst if diluted more (from 1:30 to 1:40), it gives soft negatives. If it be desired to develop with a concentrated solution (from 1:10 to 1:20) more slowly plenty of potassium bromide solution (1:10) may be added to it without the disadvantages common under such conditions with other alkaline developers. The negatives developed with rodinal losing apparently part of their density in the fixing bath, it will be necessary to develop them to some degree beyond the usual density. Over-exposed plates, if developed with a rodinal solution diluted with thirty parts of water, will give plenty of detail but thin negatives. It will be better to develop over-exposed plates with a more concentrated solution (from 1:20 to 1:15) with the addition of a large quantity of bromide of potassium solution. Vigorous and plucky negatives will be obtained in this way. Under-exposed plates should be developed with a more dilute solution (from 1:30 to 1:40); development will thus take a rather long time, but a harmonious negative will be obtained, which may afterwards be intensified if required. —*The Photographic News.*

Who is it that takes something from something and yet leaves everything as he found it? The photographer.—*Danville Breeze.*

Smiles and speech are characteristics of man, and are bestowed upon him to express thought and affection.

THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.

A STATED meeting of the Society was held Wednesday evening, March 9th, 1892, the president, Mr. John G. Bullock, in the chair.

The Board of Directors reported the election of the following active members: Henry Pettit, Francis B. Warner, Wikoff Smith, Samuel P. Sadtler, Harry W. Jayne, M.D., Justus Henry Schwacke, Charles T. Goodwin, James F. Wood, Harry Ashmead Lewis, Charles H. Adams, Paul J. Sartain, M.D., Elisha Douglas Shaw, Charles W. Beck, Jr.

On the evening of February 23d, the first of the series of special entertainments was given at the Association Hall. It consisted of an exhibition of lantern slides representing the work of about fifty members of the Society, and was well attended by an appreciative audience.

At the conversational meeting, February 24th, Interchange lantern slides from the Detroit Lantern and Camera Clubs were shown.

Nominations for officers and directors for 1892-'93 were made. On motion of Dr. Mitchell, with a view to increasing the revenue of the Society and extending its usefulness, the incoming Board of Directors were requested to consider the feasibility of establishing some form of associate membership.

Mr. Cheyney introduced a resolution to amend the by-laws so as to make the initiation fee of active members $10 instead of $5, as heretofore. In accordance with the rules action on the proposed amendment was deferred until the next stated meeting.

Mr. Cheyney read a paper on "Photographic Objectives,"* which was discussed at length by the members.

Mr. Pancoast asked if it would not be a good thing for manufacturers to mark on the lens-tube the exact equivalent focus, in addition to the optical centre, as suggested by Mr. Cheyney.

Mr. Cheyney moved that a "Committee on Standards" be appointed by the president, with power to appoint sub-committees, relative to such standards as were necessary to be adopted in connection with the description and marking of lenses by manufacturers.

Dr. Mitchell called attention to the new lens made by the Bausch & Lomb Company,—the Zeiss Anastigmat,—made of the new Jena glass. The makers claimed for this lens that it was entirely free from astigmatism, and that it covered the plate sharply from the centre to the edge without any diminution in the illumination.

* Vide page 161 Ibid.

It was particularly a wide-angle lens, having about the same length of focus and angle as a Ross Portable Symmetrical.

Dr. Sharp, referring to the new Jena glass, said that it was used quite extensively in microscopical lenses, and it was far superior in that it did away with a great deal of refraction, gave a flatter and better field, and was much finer for photo-micrography.

Mr. Cheyney said the description of this glass was a great deal like the descriptions of the lenses. The difference between a lens and a pin hole was very slight in their relative rapidity, *i. e.*, if the pin hole had a corresponding ratio to the focal length of the lens to be put there, and the same diaphragm used as the size pin hole represented, the difference in speed was immaterial,—it could not be distinguished. If they had a diamond lens it would make no difference. All this glass could do was to give them the power of covering more field sharply. As for the talk about one lens being faster than another, if the holes through which the light passed were of the same relative size to the focal length, there would be no difference in the speed of the two lenses, unless one of them were made of the most abominable glass.

Mr. Ives stated that he thought the whole matter was explained by the fact, not generally understood, that the ordinary glass used in constructing photographic lenses was practically opaque to some of the violet rays. It might be that the new Jena glass allowed more of the violet rays to which the photographic film is sensitive to pass through it than did the ordinary glass heretofore used.

Referring to the application of this principle to photographic lenses recently made by Mr. Dallmeyer, of England, and Dr. Miethe, of Germany, Mr. Stirling thought it was worthy of record that so long ago as the spring of 1891 the same idea was taken up by a Philadelphia optician, and applied in a slightly different way, though utilizing exactly the same principle. He referred to Mr. Knipe.

It occurred to Mr. Knipe that by using the amplifier of the microscope back of the objective of the lantern he could increase the power in the hands of the lantern operator. His application for a patent was filed last April, so that if priority for the adaptation of an old principle could be claimed, that honor was certainly due to Mr. Knipe, of Philadelphia. The name given to this adapter was the "multi-focal attachment," his idea being that the use of a double-concave lens back of the objective provided a series of image-producing points, and by adjusting the distance of the lenses, images of various sizes could be thrown upon the screen.

After adjournment, Mr. Stirling gave a practical demonstration of the powers of the "multifocal attachment."

The other matter in connection with the lantern, Mr. Stirling said, was the making and storing of oxygen. Those who had tried the old process of making oxygen as they needed it, and using it from rubber bags, knew what an insufferable nuisance it was. Within the last year or two, however, a London company has been organized to make oxygen by a different process from the one heretofore used, and it had been introduced upon the market in small steel cylinders, in which the oxygen was compressed up to 1,800 pounds, or 120 atmospheres.

Mr. Stirling here introduced to the members Mr. Charles William James, manager of the New York Oxygen Company.

Mr. James illustrated the use of the steel cylinders or bottles containing oxygen and hydrogen gas, and explained at length the process by which oxygen was made by the company he represented. He was materially aided in this by diagrams thrown upon the screen.

Mr. James stated that the safety devices used in connection with these cylinders were such as to practically preclude all possibility of accident; as every cylinder was tested at a pressure of two tons to the square inch. The consumption of gas for an ordinary single light lantern would average five to seven cubic feet per hour. The cylinders exhibited contained forty cubic feet.

Mr. Cheyney exhibited a simple device which he had made, modelled after the new tele-photographic lenses. Various slides from negatives with this apparatus were shown upon the screen.

Mr. John R. Clemons showed several plain silver prints toned in ordinary gold solution with the addition of the chloride of aluminum. The result was a peculiar warm brown tone of great beauty, with very clear whites.*

ROBERT S. REDFIELD, *Secretary.*

Adjourned.

The World's Fair.—It is the intention to have one room in Delaware's Exposition building fitted up in colonial style, with hangings, pictures and furniture of that period. Among the exhibits in this room it is proposed to show models of three celebrated colonial churches—the "Old Swedes' Church" in Wilmington, founded in 1699; Barratt's Chapel near Frederica, which was founded in 1780, and where, in November, 1784, Rev. Dr. Thomas Coke and Francis Asbury, afterward first Methodist Bishop in America, met with several others and planned the organization of the Methodist church in this country; and Christ Church, Broad Creek.

* Vide formulæ page 181, ibid.

REGULATIONS

ADOPTED GOVERNING THE USE OF THE ROOMS AND PROPERTY OF THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.

The use of the property of the Society is free to all Active and Life Members, with only such restrictions as are deemed necessary to preserve it from injury and waste, to lessen the drawbacks inseparable from its common use, and to ensure general comfort and convenience.

1. Loud talking, disturbing noises and unnecessary conversation with those at work or desirous of reading, must be avoided.

2. No books, pictures, or other property of the Society shall be taken from the rooms. Everything must be returned to its proper place after use. The books and periodicals belonging to the Society must not be used in the work-rooms.

3. Members must not loan the keys of the rooms or building, nor allow access to persons not members, unless in their company. All keys issued by the Society must be returned before the resignation of the holder can be accepted.

4 Visiting members of other kindred societies may have the use of the rooms, for a limited period, on presentation of proper credentials to the House Committee.

5. Members must keep all personal property in their lockers. Rubbish and worthless material must be deposited in the places provided for that purpose.

6. Members are expected to be neat and cleanly while at work, avoiding spilling or splashing of water or chemicals, and defacing or injuring any property of the Society. All dishes and vessels must be thoroughly cleansed after use, and returned to their proper places. Hypo, or other similar substances, must only be used in the vessels and places designated for such purpose.

7. The greatest care must be exercised not to raise the window sashes in developing-rooms so as to admit white light, while others are at work, or have sensitive material exposed, without full warning being given.

8. The extravagant use of gas must be avoided, and the last person in the rooms at night is expected to see that all gas and water is turned off, and doors and windows securely closed.

9. Members will be held responsible for any damage resulting from carelessness, and must pay for such repairs or replacement as may be necessary.

10. No smoking is permitted during the formal meetings of the Society.

11. The use of the rooms for games, or any other purposes not in accordance with the Charter and By-Laws, is prohibited.

12. Competitive Exhibitions before the Society, with the intention of favoring any individual, firm, or article, to the detriment of others, are forbidden.

13. The rooms, apparatus, or facilities of the Society are not to be used for commercial purposes.

14. Plates, prints, etc., left exposed by their owners during washing, drying, or other processes, must not be handled or disturbed.

15. The use of special apparatus belonging to the Society will be subject to such rules as may be deemed necessary by the Committee in charge thereof.

16. All reasonable care will be taken to prevent loss of, or damage to, articles stored in lockers, but the Society assumes no responsibility in the matter.

By order of THE HOUSE COMMITTEE.

Approved by the Board of Directors, March 3d, 1892.

NOTE.—The Janitor is on duty for the Society on weekdays, from 8 to 10 A.M., 4 to 6 P.M. He will render members such assistance, during these hours, as will not interfere with his regular work of keeping the rooms in order.

Stained Negatives.—The *Scientific American* recommends the following formula for removing silver stains from negatives, viz.:

If the negative is varnished, remove the latter by soaking in alcohol for a few minutes, then apply the following to the stained part:

A.	Sulpho-cyanide of ammonia	½ dram.
	Water	1 oz.
B.	Nitric acid	½ dram.
	Water	1 oz.

Mix A and B, and apply. A fresh solution should be made for each negative. Follow by washing and applying a saturated solution of chrome alum.

Titian preferred to paint beautiful women at thirty. Rubens readily went up to forty, and even beyond. Van Dyck did not recognize age at all; with him art was free. He held a sovereign contempt for time. Rembrandt did more; by a gesture, a word, a look, a smile, he banished all age.

In the Twilight Hour.

IMPROVE opportunities.

DO GOOD if you expect to receive it.

NEVER regret what is irretrievably lost.

HE THAT has no charity merits no mercy.

HE IS a slave that cannot command himself.

ALL between the cradle and coffin is uncertainty.

ANGER begins with folly and ends with repentance.

A FINE coat may cover a fool, but it never conceals one.

HE HATH a good judgment that relieth not wholly on his own.

BE civil and obliging to all; it costs nothing, and is worth much.

A WISE man will make more opportunities than he finds.

HE THAT thinks his business below him will always be above his business.

TO ABANDON a friend for a single error evinces a cold heart and weak judgment.

IF THERE is any person for whom you feel a dislike, that is the person of whom you ought never to speak.

TREAT your customers as your friends by serving them in the best manner, and never let them be deceived or disappointed.

CHERISH patience as your favorite virtue. Always keep it about you. You will find use for it oftener than for all the rest.

FEW things are impracticable in themselves, and it is for want of application, rather than of means, that men fail of success.

TRUE friendship increases as life's end approaches, just as the shadow lengthens with every degree the sun declines towards its setting.

IN A single century four thousand millions of human beings appear on the face of the earth, act their many parts, and sink into the grave.

IT WAS Sir Robert Peel who said: "I never knew a man to escape failure, in either body or mind, who worked seven days in the week."

THERE never did, and never will, exist anything permanently noble and excellent in any one who is a stranger to the exercise of resolute self-denial.

HARMLESS mirth is the best cordial against the consumption of the spirits; wherefore, jesting is not unlawful if it trespasseth not in quantity, quality or reason.

MANY a man lives a burden to the earth; but a good book is the precious life-blood of a master-spirit, embalmed and treasured up on purpose to a life beyond life.—*Milton.*

GENTILITY is neither in birth, manner, nor fashion, but in the mind. A high sense of honor, a determination never to take a mean advantage of another, an adherence to truth, delicacy and politeness towards those with whom you have dealings, are the essential characteristics of a gentleman.

THE GRAVE—It buries every error, covers every defect, extinguishes every resentment. From its peaceful bosom spring none but fond regrets and tender recollections. Who can look down upon the grave of an enemy and not feel a compunctious throb that he should have warred with a poor handful of dust that lies mouldering before him.—*Irving.*

Literary and Business Notes.

COPY FOR PHOTO-ENGRAVING.—Carl Schraubstadter, Jr. St. Louis, Mo.

A small pamphlet giving directions for making black and white copy, such as is requisite for the direct reproduction processes. It is concise and handy, and should be read by every one who is interested in making sketches for photo-mechanical reproduction.

ANLEITUNG ZUR PHOTOGRAPHIE, by Major G. Pizzighelli. William Knapp: Halle a. S.

The fourth edition of this well-known German hand-book. The book is well printed, and consists of 280 pages with 166 illustrations printed in the text. It is of a convenient size, and well bound, and fully answers the purpose set forth on the title, viz.—" A guide or introduction to Photography."

PHOTO-ENGRAVING, by Carl Schraubstadter, Jr. St. Louis, Mo.

A practical manual upon Photo-engraving. Strictly speaking the work is a practical guide to zinc etching by a practical worker. Every department, even the necessary arrangement and equipment of the shop, is fully treated and illustrated. The half-tone and various gelatine processes are also described. The price of the work, handsomely bound in cloth, is only three dollars.

PICTORIAL EFFECT IN PHOTOGRAPHY. H. P. Robinson, Tunbridge Wells, England. Scovill & Adams, New York. By direct arrangement with the Author—This is the third Edition of an old acquaintance.

Mr. Robinson is so well known as a photographic writer, that we do not suppose there is a photographic library in the country wherein he is not represented. All the subjects treated in the present volume are of every-day, practical importance to the intelligent photographer. The book which forms No. 30 of the Scovill photographic series should be in the hands of every professional and aspiring amateur who is not already supplied.

PHOTOGRAPHIC MOSAICS.—Edward L. Wilson: New York, 1892.

Being the twenty-eighth year of the publication of this Photographic Annual. As usual it contains a number of excellent papers by different writers, with numerous half-tone illustrations, in addition to the introduction by the Editor relative to the "Progress of Photography" during the past year. We regret that the paper and make-up of the present volume is hardly up to the standard, which prevents the practical use of the book which it deserves.

LANTERN SLIDES AND HOW TO MAKE THEM, by A. R. Dresser, M.S.L.—Second Edition (Tenth Thousand). Revised by the Author. New York, Scovill & Adams Co.

A handy little volume of 56 pages, intended mainly for beginners. The Author gives instructions in the simplest method of making Lantern Slides upon the Commercial transparency dry plate, in a manner comprehensive to the merest tyro in photography. The work, in neat paper cover and envelope, is sent post-paid to any address for 25 cents. A word to the wise is sufficient.

THE OPTICS OF PHOTOGRAPHY AND PHOTOGRAPHIC LENSES. J. Traill Taylor (Editor of The British Journal of Photography). London. E. & H. T. Anthony, American agents.

A practical treatise upon the subjects indicated upon the title-page—intended for the users of photographic lenses. Technical and scientific terms are avoided, so that the every-day worker can thoroughly understand its contents as he proceeds. A thorough study of this little volume, which is fully illustrated with cuts and diagrams, will enable the worker to more fully grasp the possibilities of his objective, whereby he will be enabled to produce far better results, with less trouble and outlay than heretofore. The book furnishes brains—which are needed under the focusing cloth as well as in the dark-room.

PHOTOGRAPHIC REVIEW OF REVIEWS, 3 St. Bride Street, Ludgate Circus, London, E. C. Edited by Walter D. Welford.

This is the latest venture in the English photographic field. The review shows care and taste in the editorial as well as typographical departments, the paper is good, type clear and plain, and the illustrations are certainly ahead of anything we have thus far seen in a British magazine. The Editor in his salutatory states "that personalities will be strictly avoided," and that his leaders "will not, as a rule, be upon abstruse subjects, nor upon such general subjects as 'Art and Photography,' but forcible, common-sense discussions of the questions of the day." In our opinion, nothing, at the present day, will tend more to the success of a photographic periodical than implied in the above announcement, viz.,—less vagaries about "Art," and more photographic common-sense. The editor and publishers of the new venture have our best wishes.

PHOTOGRAPHISCHE PROCESSE—für Amateure and Touristen. Von G. Pizzighelli, K. und K. Major in Genie Stab. Printed and Published by Wilhelm Knapp, Halle a. S., Germany. Part second of the Handbuch der Photographie.

This is the second edition of Pizzighelli's exhaustive work, brought down to date, and consists of 518 pages with 207 illustrations printed in the text. The present volume treats upon the Photographic processes, with formulas and directions for everything. From the self-preparation of the gelatine emulsion to the burnishing of the finished print, every department, old and new, of the dry plate process is exhaustively treated, both theoretical as well as practical. In the treatment upon the failures in the various manipulations, the possible cause is always given in connection with the remedy, so that a reoccurrence of the difficulty may be avoided. The book is practical in every department, and will unquestionably prove indispensable to all photographic students who are conversant with the German language.

OUR FRONTISPIECE.

Spring Flowers, a series of child studies by A. McFarland, of Mansfield, Tioga County, Penna. The negatives are all of equal excellence, and taken from the every-day work of the artist. The prints are upon the Philadelphia Alpha Aristotype Paper.

J. W. Williams, well known as one of the best traveling salesmen in the photographic supply trade, and who for a number of years past so ably represented the house of Thomas H. McCollin & Co., of Philadelphia, has severed his connection with the latter establishment, to take a position with the Eastman Company, of Rochester. Our best wishes go with brother Williams, and we extend our congratulations to the Eastman Company upon their acquisition.

Our eminent townsman, Mr. Fred. E. Ives, has been invited to deliver two lectures on color photography before the Royal Institute of Great Britain during the coming month of May.

A STREET SCENE IN PHILADELPHIA.

NEGATIVE BY
JAMES WOOD.

AMERICAN JOURNAL
OF
PHOTOGRAPHY

THOS. H. McCOLLIN, Managing Editor.
JULIUS F. SACHSE, Editor. XANTHUS SMITH, Associate Editor.

Vol. XIII. May, 1892. No.

THE PERMANENCY OF PHOTO-MECHANICAL REPRODUCTIONS.

BY JULIUS F. SACHSE.

NO subject connected with photography is more discussed at home and abroad in the various clubs, scientific societies and periodicals than the permanency of pictures produced by the various photographic processes. The much abused silver-print upon albumenized paper naturally comes in for the largest share of the discussion, and numerous are the causes given for the lack of stability. It is a well-known fact that prints made with made thirty to forty years ago, with but ordinary manipulation, which to day are still in a perfect condition; on the other hand it is not a difficult matter to find prints made less than a year ago with all care possible as to manipulation, chemicals, and selection of paper, which have so deteriorated as to be worthless, seeming to carry out the statement of an English contemporary, that "the permanence of silver-prints can never be guaranteed, no matter what care is taken in their preservation."

The same holds good in a greater or less degree not alone in photographic productions, but applies equally to every piece of printed matter, book or picture, into whose composition enters the paper and printers' ink of the present day.

Experts in paper and its manufacture have long since predicted that the books and magazines of to-day will fall to pieces before the middle of next century, while chemists tell us that the printing

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inks now in use, in place of improving by age, will soon eat their way through the pages holding the impression. In other words we have no greater guarantee that our printed matter will reach the succeeding generations a century hence in good condition, than that our grandchildren will view the photographs of their ancestors in a recognizable state.

In view of the above surmise, if it be the case, the question naturally arises, For what object are we all working? Not for the future surely,—yet literature and photography in all their ramifying branches are intended to work mainly for the future,—incidentally only for the present. Take away the factor of permanency, and the chief aim and object of both arts is lost, leaving the worker without any inducement to devote himself to either of the two professions.

Another problem which presents itself is, Why should any condition of affairs exist which threatens to destroy the usefulness of two of our most widely disseminated arts? Why is the evil not overcome?

The fact that some photographic prints have stood the test of almost half a century, and that we have books and prints made one and two centuries ago, together with specimens of the early printers, which in place of deteriorating have even steadily improved by age, while others have crumbled to dust, certainly proves that the whole trouble lays mainly with the paper.

It is argued that the books which have survived a century or over were made of hand-made paper of honest rags, without the use of deleterious chemicals; also that the photographic paper of four decades ago was made from much purer stock, and bleached without strong chemicals, while at the present day it is stated that any pulp is suitable for paper provided an acid can be found powerful enough to treat and bleach the pulpy mass.

This fact was pertinently set forth at a late meeting of the Philadelphia Photographic Society, by a member who is in the business, when he stated that "the manufacture of paper within the last few years had changed very much, and it was hard to tell what was put in papers nowadays,—anything, even to old gum boots."

One of the main reasons why this evil is not overcome is the so-called spirit of our age, with its competition, the aim of all manufacturers being to produce their wares at a lower price than their competitors, and at the same time make a greater profit. It is this state of affairs which gives us papers innocent of fibre, but strong in wood pulp and deleterious chemicals.

What is wanted at the present time is a medium or base for typographical as well as photographic work, which will ensure permanency beyond any reasonable doubt.

From the earliest ages it has always been the object of the human race to transmit the heroic part of their history to posterity. How the desire for permanency developed is shown by the successive stages of progress. In the earliest days palm leaves were employed; then the bark or rind of trees was tried, as it offered a greater and more regular surface; then in turn came waxed tablets of wood, sheets of soft lead, stone slabs, terra cotta, linen, papyrus, panels of bronze, tablets of ivory, and skins of animals and fish, until finally paper was introduced by the Saracens, which shortly supplanted all recording mediums which had not already given place to parchment.

It was Pliny who observed over 1800 years ago that "All the usages of civilized life depend in a remarkable degree upon the employment of paper, at all events the remembrance of past events." The question of a permanent substitute for paper, on account of its deterioration with age, is an old question, and dates back for more than two thousand years, when Eumenes, king of Pergamos, 200 B.C., contrived a method of preparing the skins of animals for the purpose. The name of Crates, of Mallos, is also associated with that of Eumenes in this invention. These prepared skins are what is known as parchment, upon which all important documents have been written, and occasionally printed, even unto the present day, as the skins, if properly prepared and used with honest inks, give us a reasonably permanent record.

The cost of the vellum, its peculiar nature, and the limited source of supply, however, limit the use of this medium to special work. This problem of a durable medium for recording passing events is a vital question, yet, strange to say, with all the scientific

attainments of this enlightened age, we are as far from a solution as were the sages of twenty centuries ago.

What has been said about the nondurability of the printed matter of to-day applies equally to our photo-mechanical reproductions; for instance, we are told that a half-tone printed in printers' ink upon fine coated paper is permanent beyond any doubt. There is no greater delusion. Take for an example our illustrations in the JOURNAL; they are printed upon the heaviest and best coated paper procurable,—how long are they going to last? Printers and interested parties will answer that they will be as good 100 years to come as now. So far so good: we hope so, but do not believe it.

Now let any one who is interested go to any of our large libraries and ask for a book with steel engravings printed upon coated or "satin" paper, such as was in vogue for fine work half a century ago. Upon examining the plates it will be found that the metallic surface has become oxidized and discolored, and in many instances completely ruined, and this with honest fibre paper, and without the use of deleterious chemicals in the process of manufacture. Now in what state will our present half-tone plates be in the year of grace 1950?—considering the metallic coating upon a web of wood fibre or macerated straw, on which an impression is printed or laid with the cheap inks of the present competitive age, which will "set off" even a year after it is printed.

Under present circumstances little guarantee can be even given that the paper upon which our finest photogravures are printed will not crumble to dust long before the twentieth century has become a cycle of the past. It has been noticed that the plate paper used for this process was so brittle that it showed a fracture at the plate mark, and this, too, with careful printing.

We have here a vital question, which affects all persons engaged either in photography, literature, or the photo-mechanical processes, and it is well worthy of the consideration of our scientific and photographic societies at home and abroad.

THE WET COLLODION PLATES.—II.

BY ELLERSLIE WALLACE.

(Continued from page 101, Vol. XIII.)

AS the prepared wet collodion plate has to be exposed in the camera and developed within a few minutes, or before the film has time to dry, it is hardly necessary to say that everything must be in readiness for exposure before the preparation of the plate is begun. I may say here once for all, that the dark-room in which the collodion plates are prepared and developed need not be as dark as when gelatine plates or films are used. If daylight be admitted, one thickness of good pot-metal orange glass will often suffice, though it is well to have a screen of yellow post-paper or a couple of folds of yellow muslin ready in case the sun should strike upon the glass. Of course only one pane of the window is to be glazed with the yellow glass, the remainder of the sash being darkened with some opaque material. If a gaslight be preferred, surround it with a yellow glass chimney.

A very little work in the abundant pleasant yellow light of the collodion dark-room will convince the operator of the great saving of eye-strain. A collodion dark-room is perfectly safe when so full of yellow light that the labels on bottles in the darkest corners can be distinctly seen. It is never necessary to employ red light, which is so injurious to the eyes.

No particular directions as to the fitting up of the collodion dark-room need be given. The two most important things are plenty of safe orange-yellow light, and free ventilation to carry off the fumes of the collodion and the acid developer. It is taken for granted that there is a good water supply, and heat enough in winter to make the room quite comfortable to work in.

Before making up a stock of collodion, a number of bottles should be selected, fitted with good, sound corks, and thoroughly cleaned. I always prefer *new bottles* that have not been used before. After being well washed, they are turned bottom up to drain for an hour or two, and finally rinsed out with an ounce of

pure alcohol to remove all traces of water. This apparently trivial matter should never be neglected.

Collodion is a solution of pyroxyline or gun-cotton in ether and alcohol. Care must be taken that the materials are of good quality, and they are to be bought only from dealers of established reputation. The alcohol and the ether are both specially prepared, and the above hint about removing all water from the bottles is important in preventing dilution of the spirits and consequent spoiling of the collodion. The ether should never show an acid reaction to test paper. The cotton should be nearly white, free from smell, and when a portion of it, the size of a cherry, is exploded on white paper, there should be only a few black sandy grains of ash left behind. It must not be forgotten that all photographic "cottons," as they are called, are violently explosive, and that ether and its vapor are very inflammable.

The most convenient plan to pursue in collodion making, is to make up a considerable quantity, say a gallon or more, and to prepare the iodizer or exciting fluid in a separate bottle. If the iodizer were incorporated with the collodion directly, the whole would be spoiled after a few weeks' time. Therefore small quantities of the plain collodion can be decanted off from the stock bottle, and iodized, according to the amount of work to be done. The collodion always requires a few days to "ripen" after the exciting fluid is added; it is then in good working order, and will remain so for some days or weeks, depending upon the formula used for the iodizer.

The behavior of collodion, under the the action of different iodizers, is so interesting and so useful a thing to know that I wish to speak of it a little more in detail. The alkaline iodides, such as magnesium, ammonium and potassium, will ripen a collodion very quickly, say in twenty-four hours or so, but within a few days the collodion will turn red, lose sensitiveness, and run thin like water. The same is true of the alkaline bromides, which are always combined with the iodides in the proportion of about two-and-a-half parts of the latter to five parts of the former. For instance, a collodion might be made up as follows: Dissolve four-and-a-half grains of iodide of ammonium and two-and-a-half

grains of bromide of magnesium in half an ounce of alcohol. Filter, add half an ounce of ether, and finally add five or six grains of negative cotton, and shake till dissolved. This collodion might be used the next day, and would retain its exquisite sensitiveness for rather less than a week. But supposing that five grains of iodide of cadmium were used in place of the magnesium, the collodion would not be in good condition to use inside of five days, and would be better if kept for two weeks. The amount of cotton in this case could be reduced to, say, four-and-a-half grains, instead of six, for the iodide and bromide of cadmium have the property of thickening collodions and ripening them very slowly. In fact, their action is the opposite of that of the alkaline salts.

Now with these facts plainly understood, it is easy to see that collodions of all kinds to suit all kinds of work may readily be made up. Suppose a collodion is wanted for slide-making, and to give a thin, very even, and perfect film without too great density. In this case it would be well to combine the cadmium and ammonium salts in about equal proportions, and give the excited collodion a couple of weeks to ripen. If it proved to be a little too thin, half a grain per ounce additional cotton could be used, and the collodion immediately filtered through one of the tall glass-capped filters sold for the purpose. On the other hand, when great density is required, as for copying fine engravings, etc., the collodion should be made considerably thicker at first, increasing the cotton to six or seven grains per ounce, and the iodine to six grains. It must be remarked that the quality of the collodion always depends in great degree upon the cotton. Some samples give thickness enough with four-and-a-half grains to the ounce of mixed ether and alcohol, while others may be used in as high a proportion as eight grains. The best results are generally obtained with about six grains, and the cotton ought always to be perfectly soluble and not leave any great amount of white gummy residue behind. The most useful formula for collodion for average work is as follows:

Snowy cotton	6	grains.
Ether	½	ounce.
Alcohol	2½	drachms.

A few days before use add to the above *one-and-one-half-drachms* of the following iodizer:

Alcohol	1½	ounces.
Iodide of cadmium	28	grains.
Bromide of cadmium	10	"
Chloride of cadmium	4	"
Iodide of ammonium	20	"
Bromide of ammonium	7	"
Iodine	1	"

The above is an old and well-tried formula. The iodized collodion remains in excellent condition for more than a month. The chloride of cadmium and the iodide are unimportant, and may be omitted if preferred. The iodide is merely added so as to give color to the collodion, and the chloride confers a little more density upon the film. As before remarked, the plain collodion should be made up in quantity and allowed to settle until clear, and the top portions decanted off for use. The above quantity of iodizer is intended for eight ounces of iodized collodion, the proportion of equal parts of ether and alcohol being exactly made up when the collodion and iodizer are mixed. It is not advisable to make a very large quantity of the iodizer at once, and it should be kept side by side with the plain collodion on a shelf in a cool, dark cellar.

Those who prefer to buy collodion ready made will find a good assortment at the dealers. But it is more economical to make it, and for myself I can say that I prefer the above to any commercial article.

Amiability, courtesy and tact, should be prominent accessories in every gallery.

By light and shadow all objects and parts of objects are made to project or recede, to strike or retire, to court or to shun the attention of the spectator, agreeably to truth and propriety. Thus, if properly managed, it contributes infinitely to expression and sentiment; it lulls by breath and gentle gradation, strikes by contract, and rouses by abrupt transition.

IMPRESSIONISM IN ART.

BY XANTHUS SMITH.

SO much attention is now being drawn by exhibitions, sales of paintings, and magazine and newspaper articles, to the subject of impressionism in art, that a few words may not be without interest to our readers, both amateur and professional, upon that subject.

There can be little or nothing in the so-called impression art that possibly can, or should be, in sympathy with the tastes and feelings of the photographer, because his art deals truthfully with nature, whereas the art of the impressionist does not.

We must explain, however, at the outset what impressionism really is.

It refers solely to those transient effects in the appearance of scenes and objects in nature which make an impression on the beholder at the time, too brief to be copied, but which may be carried away in the mind and reproduced in future, with just so much truth as it is in the power of the individual to carry and set down upon his paper or canvas.

The power to store up quickly in the mind a large amount of a picture, as presented to us in nature, and afterwards to reproduce it by the materials of painting, is a rare one, and contributes a very important part of what is known as genius or talent in a painter. Impressions, as painters call them, constitute probably the highest qualities in art, and solely because it is those only who are gifted as artists who are capable of receiving choice impressions and fixing them in such a way as to convey them for the pleasure or benefit of others.

Thousands there are who are capable of copying faithfully, where prolonged time permits, natural scenes and objects under the ordinary conditions which may endure for hours or days together, but such are never rated above mediocre. Their work is little more than a sort of higher mechanism, and hence the great importance of impressionism, which gives us, in addition to

this truthful rendering, those higher transient beauties which constitute the true poetry of nature.

While impressionism holds the high place which it does in art, it is yet not the end, but merely a constituent of complete art expression or reproduction, and therefore artistic impressions as set down upon canvas or paper are merely stages in the progress of finished pictures. They are called sketches, and if parted with during the artist's lifetime are valued at a minimum rate, as works which, though requiring talent and effort of memory, are quick of reproduction and incomplete as pictures, though they may become extremely valuable after the death of an artist, as in the case of all eminent deceased painters.

The sketches or impressions of artists may be in simple outline, in which case they refer to composition; or in washes of light and dark, which constitute impressions of effect; or lastly in color; and in the progress of a complete picture there are generally representatives of all of these. They are valuable auxiliaries; but in addition, on the finished canvas, there should be admirable drawing, and beautiful execution, as painters call it, referring to the use of the colors and brushes, and delicacy and refined harmony in the coloring, all requiring acquired skill and application, often for months together, to convey the look of finish and truth to nature that a legitimate work of art should possess in its complete form.

By a curious combination of circumstances, the two following having an important bearing in the matter, namely, the foisting off on the public, by some dealers, of the crude sketches and unsuccessful efforts of some men of ability as great paintings, and the rage for novelty and sensation of a lot of incomers in art, an entirely mistaken idea in relation to art has come about, one, unfortunately, that is exceedingly detrimental to the cause of good and true art and its legitimate aims, and mystifying to the public and discouraging to the legitimate painter.

The good old idea that the ability to be a painter is a gift of nature has become almost extinct. The ruling belief now is that painting may be acquired by simple teaching, just in the manner that any trade may be learned by anyone who takes the notion to pursue it, and the consequence is that there are a thousand

painters to-day to one that there was twenty-five years ago. Hundreds of ladies and gentlemen of means take to art at present as an agreeable if not a lucrative pursuit. Four-fifths of these are not only absolutely devoid of sufficient talent for the pursuit, but have not even sufficient application to tax themselves with the drudgery necessary to attain any degree of excellence.

Is it to be wondered at, therefore, that these would-be artists seize with avidity upon a means of expressing themselves in art which enables them, with little thought and less labor, to cover their canvas with inane daubs, which they can exhibit to the public as wonderful productions of the new school of painting.

Many of those who really would be picture buyers are mystified. They are told by many ignorant critics and by the adherents of the impression school that these works, in which they can see no resemblance to nature and no beauties as works of art, convey certain inexplicable qualities which lift them above the realm of the common understanding, and when they look upon a true work of art, full of the beauties and truths of nature, the result of skill and thought which they feel must be right, and are told that such is mere chromo work, they turn from both, having nothing to do with either, inwardly feeling that they are not in sympathy with the one,—that if they place it upon their walls it can give them no pleasure,—and that if they purchase the other, which their better judgment tells them is right, they may only be exposing their ignorance of high art.

It is in landscape art that impressionism has made the greatest headway. People will not tolerate in figure subjects the extreme vagaries in the way of bad drawing and execution that they will in landscape scenes. Poor landscape! Strange to say, people will pause and wonder over, and some accept as highart, the veriest daub for a tree or a cloud, in which in reality there is all the choicest delicacy and refinement of drawing and coloring which nature can bestow, while they will laugh at as an absurdity a human face which is attempted in representation by a mere smearing of the canvas.

An additional and potent factor in the success of impressionism is its lucrativeness to some dealers. By securing the unfinished

studies and crudest sketches of noted foreign painters at comparatively trifling sums, and disposing of them on this side of the water as wonderful productions of genius for enormous sums of money, and further, on account of the extreme ease and rapidity with which impression pictures may be counterfeited, and at the most trifling cost, and the tremendous profit in the disposal of these spurious pictures to rich but ignorant purchasers, as genuine works, for large sums, it has become a business well worth pushing to the fullest extent. It matters little to the buyer whether the work is genuine or not. He purchased it as genuine; the artist accredited with it is not on the ground to say whether he painted it or not, and who dare dispute it. Is there not infinitely more eclat in displaying to your visitors pictures by Corot, Daubigny, Rousseau, etc., even if they do look like the veriest daubs, than in showing them faithful work by artists of your own town, whom you and your friends know personally?

It is not a question of love of nature and art with the present American picture buyers, but of mere notoriety as an art patron.

Is it to be wondered at that a host of young artists and their friends should cry up this new and easy road to fame which spares all the earnest application necessary to be a very fine draughtsman or highly skilled applyer of the materials of painting, and spares all thought, and study of the fundamental principles of art?

We can only hope that sensible people generally will pause, and remember that art is founded on nature, and that whenever it strays too far from her truths and beauties it is off the track.

Hamerton, the greatest living art critic, says of the present French art that is over-ripe,—"it is rotten"; and to close let me quote what H. P. Robinson, the great art photographer and writer, whose views are so well known to all intelligent photographers, and cherished by them, has to say upon the subject of impressionism in art:

"Incoherence in art.—There are no words that can say how bad art may be when it is divorced from those qualities on which it has relied for ages,—from composition, chiaroscuro, meaning; from articulate and intelligible speech. In literature many uneducated and incompetent persons get pleasure, and, if

properly worked, some fame, or, at least, notoriety, out of scribbling incoherences. Impressionism may be called the incoherence of art. If it can be mixed up with vague emotions, it is so much the more taking.

"Impressionism is best suited to those who have not taken to serious art. It is a flattering amusement to the ephemera of art—the young student who lives for the present and cannot hope to get much further, and the amateur who takes to art late in life as a distraction from the cares of business. It is easy to the operator, and *not* easy to be understood by the spectator, having that touch of mystery which is almost as delightful as tricks with cards."

The latest photographic novel is Grant Allen's "Recalled to Life" (Arrowsmith, 3s. 6d.), wherein the heroine is found, at the opening of the tale, in a room alone with her murdered father. The said father has invented a machine camera which takes six instantaneous photographs in succession by the aid of an electric light. During the murder the machine has "gone off," and has presumably taken six pictures of the dreadful scene. But of the six only one negative can be found, and this is a back view of a man escaping from the window, and must therefore have been the last of the series. The heroine has entirely lost all memory of the scene and of everything in her life which happened before the dreadful occurrence. Her health is restored, but not her memory, and she devotes her life to the discovery of her father's murderer. She finds at last in a "snap-shot" photo. of some athletic sports a man with a back precisely like that in the "machine photo.," and she travels to Canada after him. He turns out to be her old lover, and he is also possessed of the five missing negatives. These show that the murder was not a murder, but that the dead man, who was an imposter and not the heroine's father at all, was killed by the young lady herself in self-defence. The story is an exciting one, but we fear that Mr. Grant Allen would find it difficult to answer the questions which a practical photographer would be inclined to ask.—*Bulletin.*

A beautiful smile is to the female countenance what the sunbeam is to the landscape. It embellishes an inferior face, and redeems an ugly one.

PLATINUM TONING AS APPLIED TO GELATINO-CHLORIDE PRINTING-OUT PAPER.

BY JAMES BROWN.

[Read before the Northern Counties Photographic Association.]

FASHION, which regulates the cut of our garments, has, as might be expected, some considerable influence in matters photographic. During the past two years there has been a steady movement in the direction of warmth of tone. In the higher regions of photographic art there was a time when "Big and Black" held supreme sway, and anything approaching tones which most of us now admire was a thing held accursed. Now men's minds are everywhere asking, How shall we arrive at the warmest tones? and skilful concocters of formulæ are holding high revel in their search for the mystic process which shall forthwith make all things sepia. The numerous methods of toning (or staining) bromide papers recently published afford evidence of how strong is the revolt against blacks. We have, indeed, need to be careful lest, by over-doing it, we induce a revulsion of feeling. Above all, let us not outrage the eternal fitness of things by such proceedings as printing winter landscapes a bright red, and so forth.

Amongst all the methods of getting rich warm tones, I know of none equal to that which it is my privilege to bring before you to-night—viz., the use of a gelatino-citro-chloride of silver paper and chloro-platinite of potassium as the toning agent, as by its means we can get tones of the most exceeding richness and warmth with ease and certainty.

Gelatino-Chloride Described.—After lying stagnant for many years, the gelatino-chloride process has at last become very popular. In its original form it was a collodio-chloride emulsion, invented by Mr. G. Wharton Simpson in 1865. It never made much headway—why, it is difficult to say. To my mind, a collodion image is in many points superior to a gelatine one. Amongst its principal exponents was a north-country photographer—Mr. George Bruce, of Duns. In 1882 Captain Abney

proposed a gelatine emulsion, and his formula became the foundation on which every one has subsequently built, until the analogous collodion paper was almost forgotten. On the Continent, however, there has for the last year or so been in use a collodio-chloride paper, and recently a similar product, under the name of Celloidin paper, has been introduced into the London market by Messrs. H. Kuntzen & Co., samples of which I show you to-night. The late Herr Obernetter was first in the field, in 1885, with his now celebrated emulsion paper, followed by Liesegang, and after the lapse of five or six years we now have the choice of at least two brands "made in England."

My intention to-night is not to read a scientific paper, or to indulge in any theoretical or chemical speculations, but rather to go upon solid ground, over which I have myself trodden, steering clear of everything which has not been thoroughly substantiated in my own experience, and will treat (1) of printing, (2) of the toning bath, (3) of the process of toning, and (4) of finishing.

It may be mentioned here that my experience almost solely relates to Obernetter paper, but I have handled nearly every brand in the market, and shall have something to say of each.

Printing is conducted in the ordinary way, any negative that is not either hopelessly thin or dense being suitable. Contrary to the text-books and advice so plenteously given, it is not necessary to over-print any more than on albumen paper—in fact, to do so is in most cases distinctly harmful.

After toning with platinum, no paper I have yet tried reduces to any great extent in a properly made fixing bath, and if we desire a matt surface, and so squeegee on ground glass, that operation considerably adds to the depth of the image; so, if we over-print, "leatheriness in the shadows" will result. It is necessary to remember, however, that the depth of printing must have some definite relation to the tone we desire to obtain. This will be discussed when we come to the toning stage.

The toning bath which I have found to be the best is a simple one:—

Potassium chloro-platinite	1 grain.
Citric acid	10 grains
Distilled water	4 ounces.

A platinum bath will only work when acid, and the use of citric acid, instead of nitric, as usually recommended, is a great improvement, due to Professor Burton, who found that the latter acid has a staining influence upon gelatine.

Other baths have been recommended, which are not so good as the above, and possess the serious disadvantage that they will not keep, whereas this one will keep indefinitely, provided the prints be properly washed before toning, so as not to contaminate the bath by silver salts. I have here a bottle containing a bath made up over two years ago, which has been in constant use ever since, strengthened when necessary by adding more platinum, which I keep in a dropping-bottle mixed in the proportion of one part platinum to twenty parts water. When of proper strength, the bath is of a dark straw color, and as the toning agent is used up the solution becomes paler, so that by a little observation it is easily seen when the bath wants strengthening.

The Manipulations of the Process.—Coming to the actual manipulations, the first item is the preliminary washing, which must be *thorough.* The first wash must be thoroughly performed, so as not to keep the prints soaked in the dissolved-out silver, else yellowing of the high lights will result. After four changes of water, it is necessary to dissolve out all the remaining free silver by a salt bath. After a minute or two in this, and another rinse in water, the prints are ready to tone. At this stage they are but little changed, and the process of toning, unless much prolonged, produces no effect that is visible to the eye. We only discover what tone we have got when the prints are in the hypo bath ; but the action is so regular that success is certain. It is instructive, however, to see what color of images we are working upon by fixing a print without any toning, and I will presently show you a few examples. It will be found that the image suffers a very considerable reduction, and partakes of a yellowish-red hue. By simply fixing without toning, warm red tones can be got if we print deep enough to compensate for the reduction that takes place, and there is no reason to suppose that such images could fade any more than does a bromide print. Indeed, the chances are in favor of the former, as it has not been in contact with any

salts of iron, or acid clearing bath. I have spoken of the necessity of keeping up a definite relation between the depth of printing and the ultimate tone desired. Simply fixing a print reduces its depth, but the more platinum we associate with the silver image, the less does it reduce. This applies to all papers, but in a greater degree to the Ilford "Printing-out-paper." Toning then proceeds on certain definite lines, the stages being red, reddish-brown, sepia, brown, dark brown, and purplish-brown. For the first stage, printing ought to be continued till the deepest shadows are slightly bronzed, and the the toning will take, say, five minutes. With such an over-printed image, longer toning seems to intensify the print, and to block up the shadows. For any other tone than red, it is not advisable to print till the bronze stage is reached, but to stop when the whites are slightly tinted, and toning will be accomplished in from five to fifteen minutes. The warmth of tone which is the characteristic of this process, it is evident has for its foundation the yellowish-red of the silver image, and, as we associate it with platinum in a greater or lesser degree, the tone varies from a warm red to the other shades I have named. There have been various attempts to completely substitute platinum for the less staple silver, but with no success. It was first supposed that the toning process was a depositing of metallic platinum upon the image; then it became the belief that a partial substitution took place; but Lyonel Clarke, in his book, assumes, with considerable show of reason, that an alloy of silver and the nobler metal takes place. Be that as it may, it is a process which, for certainty and beauty of results, merits every one giving it a fair trial.

After toning, the prints may be immersed in a weak solution of common soda, to neutralize any acidity present and stop toning, or may be placed direct in the fixing bath, made distinctly alkaline with ammonia, and not stronger than one part hypo to eight parts of water. For the sake of giving the prints a fair chance in the battle of life, it is advisable to have the hypo bath fresh, and to fix for not less than half an hour, After thoroughly washing in copious changes of water, the prints are given a five minutes' soaking in a bath of chrome alum of about twelve grains to the

ounce. To avoid acidity, neutralize this with ammonia, and filter out the dense precipitate which is formed. This is of the greatest advantage, as it hardens the gelatine and renders it almost impervious to damp. So great is its hardening effect that a print so treated and dried cannot again be softened, and resists water almost boiling.

The next stage is the squeegeeing, which is best done upon finely ground glass. Bear in mind, however, that this must take place as soon as they are washed free from the chrome alum, as, if they are allowed to dry, they cannot be so treated. The adoption of the alum bath makes the sticking of prints to the glass almost an impossibility, and this is no small advantage. Much rubbish has been written about cleaning the glass plates previous to putting down the prints—by myself amongst the number. If really dirty, monkey soap will remove it all. Flowing hot water over the plate, and rubbing with the palm of the hand will do the rest. It can then be placed under the tap and cold water run over it, then place the print in position, with blotting-paper on the top, then a piece of waterproof sheeting, and squeegee vigorously. It is necessary to remember that any attempt to remove the prints before they are dry is to court failure. A matt surface may be got much more easily by the use of finely ground pumice-stone powder, rubbing it in on the dry print by hand. Mounting presents no difficulty if the prints be properly hardened in the alum bath.

The Second Annual Photographic Exhibition of the Manhattan Chapter Photographic Section, of Agassiz Association, will be held from May 2d to May 7th, 1892, at 139 East 40th St., New York City. The Committee of Arrangements have decided to issue a catalogue of the exhibition, and are making efforts that this exhibition shall surpass the one of last year in every particular.

Newark Camera Club.—At the annual meeting held at the club rooms, 828 Broad Street, Newark, Monday evening, April 11th, the following officers were elected for the ensuing year: President, Paul L. V. Thiery; Vice-President, Thomas A. Hine; Secretary, David S. Plumb; Treasurer, Frederick T. Fearey.

Dr. Joseph Maria Eder has been elected an honorary member of the "Societâ Fotografica Italiana," in Florence.

PLATINUM TONING ON MATT-SURFACE PAPER.

BY T. O. MAWSON.

(Read before the Newcastle-on-Tyne Photographic Association.)

AT the present time there are so many different printing papers in the market that it is difficult for the amateur photographer to decide which process to adopt. The tendency at present is to obtain warmer tones on a rough or matt-surface paper. I hope to demonstrate to you this evening how very simply this is done.

We have all worked with the ordinary albumenized paper, and can, doubtless, produce a good print, and, as the working of plain paper is in every respect similar, I think you will all agree with me that this process is better suited to the amateurs' requirements than any other.

Very beautiful matt-surface prints can be obtained on any of various brands of gelatino-chloride papers; but the manipulation of these papers is a little more complicated. The prints require to be passed through an alum bath and then squegeed on to ground glass, or rubbed with powdered pumice-stone till the desired surface is obtained. These operations are of course not required if you start with the matt-surface paper. Toning takes only a fraction of the time required to tone albumenized paper with any of the usual formulæ for gold baths. Blisters (the bête noir of the amateur) are unknown; there is neither albumen nor gelatine present to cause these objectionable comparisons.

The brand of paper I have always worked with is that made by Mr. Valentine Blanchard; he sends his paper out with a supply of toning solution sufficient for the paper. My own toning bath is made up from the formula given in Mr. Lyonel Clark's work on platinum toning, and I may as well mention here that the formulæ I shall have occasion to mention later on are all taken from that same excellent work. I have tried them myself, so can testify to their working satisfactorily.

I will now run through the operations necessary to produce a matt-surface, platinum-toned print, and am sure, if any of you will

take the trouble to sensitize your own paper, you will be amply repaid; you will find the home-sensitized paper prints much more quickly than the commercial article, and another great advantage is, you can select a paper with the necessary degree of roughness to suit the subject you are about to print.

The paper I have used when sensitizing has been Whatman's drawing paper. This is excellent paper for the purpose, and can be had in several grades of surface. The rough water color paper is specially suited for large prints. It has only one objectionable feature, and that is, it is very porous, and before the end of the washing gets something like saturated blotting-paper; great care is therefore necessary to prevent tearing or otherwise damaging the prints.

Having selected the paper, the first operation is to size and salt it. This is done in one operation, the paper being floated on a solution of chloride of ammonia and arrowroot, as follows:

Arrowroot	180 grains.
Water (to one pint)	160 grains.

or

Arrowroot	180 grains.
Chloride of ammonia	120 grains.
Recrystallised carbonate of soda . . .	240 grains.
Citric acid	60 grains.
Water (to one pint).	

The arrowroot is made into a stiff paste with a little cold water, then about fifteen ounces more water added, then boiled till clear. When clear, it is removed from the fire, and, when sufficiently cooled, the chloride of ammonia, dissolved in the remainder of the water, is added.

This solution should be allowed to stand all night; the clear portion is poured off into a suitable dish, and the paper floated on the surface of the liquid. I find Whatman's paper requires about three minutes floating to be properly impregnated with the solution. After removal from the salting bath, the paper should be laid, face upwards, on a level table, to allow the solution to be absorbed, then hung up to dry. I find, if hung up to dry

directly it is taken from the bath, that the solution runs down in streaks, and though not noticed when the paper is dry, unevenness of silvering takes place in consequence. It is as well to salt a good supply of paper when you are about it, as paper in this condition will keep any length of time. The back (or unsalted side) should have a pencil mark put on it for future guidance.

The salted paper is now ready for the silver, or sensitizing bath, made up thus: Dissolve

Citric acid	25 grains.
Water	½ ounce.

and

Nitrate of silver	60 grains.
Water	½ ounce.

These solutions are made separately and mixed. The salted paper is then floated on the solution, care being taken that no air bubbles are between the liquid and the paper. Three minutes will be found long enough for the paper mentioned; it is then removed from the bath and hung up by a wooden clip to dry. This operation must be performed by gaslight, or in the dark room Paper sensitized in this manner will not keep very long; it is better to sensitize just as much as you require for present use.

Printing is carried on to about the same degree as with albumenized paper till there is a distinct bronzing in the deepest shadows; when sufficiently printed, the prints are washed in several changes of water and toned in following solution:

Chloroplatinite of potash	4 grains.
Nitric acid	1 or 2 drops.
Water to	2 ounces.

On immersion in this toning bath, the print immediately begins to darken, and toning to the black stage is arrived at in about five minutes. If warmer tones are required it is better to dilute the bath to four ounces with water. The action is then more under control, the toning action stopped as soon as the desired tint is obtained.

Fixing is conducted in the ordinary hypo bath, four ounces of hypo to one pint of water, made slightly alkaline by the addition

of a few drops of ammonia. I find, however, this alkaline bath has a tendency to produce a warm tone, and if a black tone is desired I use the the acid fixing bath recommended for negatives containing one ounce of bisulphite of soda, and four grains of hypo to the pint.

After fixation the prints are washed in the usual manner to free them from hypo, and dried between blotting-paper.

Having now briefly run through the necessary operations from plain paper to finished print, I think you will all agree with me that this process is about as simple as any. You have nothing new to learn; simply print, tone and fix with the usual intermediate washings, and you obtain a picture which will be "a thing of beauty and a joy forever."

According to E. Valenta, prints on salted paper prepared with a resinous emulsion, may be successfully toned by the chloroplatinite bath in the following way. The sensitive paper, which has been previously fumed foı ten minutes with ammonia, isprinted very deeply under the negative, and then toned for a short timein a freshly-prepared or old chloride of gold toning bath, as has been recommended for this paper. The prints are then rinsed with water,and placed in a toning bath consisting of

Water	300 c.c.
Potassium chloro-platinite	1 gram.
Nitric acid	20 to 25 drops.

Fixing is done in a bath consisting of 120 grams of hypo, 10 c.c. of sulphite solution (sodium bisulphite dissolved in water 32° Baume), and 1,000 c.c. of water, washing in running water for from three to four hours. Finally the prints are dried. The toning is very quick, and it will be necessary to remove the print from the bath as soon as the desired tone has been attained, to rinse it with clean water, and to place it in the above-mentioned fixing bath. The fixing process will be finished within ten or twelve minutes. If the print be left too long in the chloro-platinite toning bath, the delicate half-tones of the image will be partly destroyed. The action of the toning bath upon the prints will be slower if less nitric acid be added to it; in the case of the above given quantity of from twenty to twenty-five drops to 300 c.c. of the bath, the black platinum tones are obtained almost instantaneously.—*The Photographic News.*

NEW MODE OF PRODUCING COLORED PHOTOGRAPHS.

OUR esteemed contemporary, the *Scientific American*, in the issue of April 16th, 1892, publishes the following method for obtaining colored photographs. This time the discovery hails from the Windy City,—Chicago. Comment upon the scheme is unnecessary. We will only say that when the problem of color photography is actually solved, the fortunate discoverer will show results first,—similar to the course of action pursued by our own Mr. Ives in his color projections, and not bother the public with a description of the process beforehand.

We almost forgot to say that the promulgator of this latest color process is a James W. McDonough, who describes it as follows:

I take a support of plain glass, celluloid, paper, or other suitable substance, upon the surface of which is a sensitive photographic coating, preferably forming what is known as an "orthochromatic dry plate." This may be rendered tacky by immersion in water or diluted glycerine. If preferred, however, the plate may be used before it becomes quite dry in the course of its manufacture. I dust the plate, either while it is somewhat moist in the course of its manufacture, or after it has become tacky, as above explained, with a mixture of colors composed of fine or powdered particles containing the colors desired. I thus obtain a colored surface composed of particles lying side by side which have the properties of stippled colors instead of the properties of a true mixture of pigments. In order to get these colored particles, I use colored powdered glass, transparent pigments, gelatine, resin, shellac, or similar substances stained by aniline dyes, etc. In the preparation of the colors by means of shellac I take a sufficient quantity of clean white shellac dissolved in alcohol, to which I add aniline colors—say for one lot red and yellow colors—in such proportions that the result will be a red, which when viewed by transmitted light in layers will cut off or absorb as much green, blue, violet, and yellow as possible, or which, in other words, will transmit as

far as possible a pure red. Another lot is colored with as pure a green as may be formed by mixtures adding yellow to absorb blue. Another lot is colored blue. As the mixture of colors formed in this way by red and green does not form a bright yellow, I may use in addition another lot colored as near the yellow of the spectrum as possible. These lots, after being thus colored, are allowed to dry, forming colored masses, which are then reduced to powder by grinding, sifting, etc.

If now proper proportions of red and green are mixed, a nearly black or gray mass will be formed, and if proper proportions of red, green, yellow, and blue are mixed, a mass will be formed that is nearly black or gray; but if this same mixture is dusted or finely spread upon the prepared sensitive surface, it will reflect or transmit a mixture of all these colors, which will be white in proportion to the purity of color, cleanliness of mixture, and quantity of light transmitted or reflected. The glycerine may be washed out, so that only the colored particles in the mass in which they are arranged remain. When viewed under the microscope, the white surface is seen to be composed of a multitude of different colored particles lying side by side and separated by small distances. This surface may be flowed with a thin coat of gelatine, which will penetrate the spaces between the colored particles, or the ground and colored particles may be coated with gelatine before applying them to the tacky surface by mixing them with a small quantity of dissolved gelatine and regrinding them, according as a mat or smooth surface is required.

The process of producing the effect called "color," above described, is by absorption of light; but inasmuch as color effects may also be produced by refraction, dispersion, or diffraction of light, I do not mean to limit myself to absorption only as the means of production.

The photographic plate thus obtained, consisting of colored particles applied to its sensitive surface, may be exposed to the action of the light from the object to be photographed through a camera in such manner that this light will pass through the colored particles and affect the sensitive film, thus producing a latent image of the object. The plate may then be developed by

the use of the so-called "alkaline pyro developer," so that the colored particles will adhere to the surface, which is penetrated by the same colored light as the particles themselves, because gelatine is rendered insoluble in proximity to the silver particles in the sensitive compound where acted upon by light. Thus particles which do not allow the passage of colored rays on account of absorption may be washed off, because as to such particles the gelatine remains soluble. Thus blue rays will cause blue particles to remain as an image, white light all the colored particles in that space acted upon by white light, and all will be removed where black occurs, which does not act upon the photographic film. After the development, the picture may be treated with thiosulphate of soda to remove the sensitive compound not acted on by the light and developer. By thus developing the plate a picture is produced composed of the particles of silver and the colored particles remaining on the plate after the development. This picture may be used as a negative, or backed with a black or other colored surface as in an ambrotype. The colored image is formed by the reflection of light from the particles, or through the particles from the silver image, or by the transmission of light through them when not cut off by the image. The use of the orthochromatic sensitive plates and color screens before the camera for the purpose of sifting light and regulating the action of different colors upon the film is too well known to require explanation. I will merely add that the particles are dusted spread, or placed upon the plate in such proportions as to produce a transparent surface.

The subject of tele-photography is exciting as much discussion throughout the continent as it is in England and America. Views have lately been shown, taken at a distance of 7,000 metres by a device adopted by M. Jarret, a well-known French optician.

At the late meeting of the London Camera Club, one of the members remarked that "photography may or may not be able to lie, but there was no doubt that photographers could and did."

URANIUM TONING OF BROMIDE PRINTS.

BY J. WEIR BROWN.

[A Communication to the North London Photographic Society.]

SINCE I first published the results of my experiments for obtaining warm tones on bromide papers a good deal of attention has been given to the subject, both at home and abroad. I should like, if I could, to give you what I might call the whole subject of bromide toning up to date; but this would be a large order, as there are now so many methods suggested. In my first communication on this subject to the *British Journal of Photography*, I expressed a hope that what I had written might lead others more experienced than myself in photographic chemistry to take up the subject and perfect the process—to complete the ship, of which I had laid down the keel, or to build another. It is gratifying to me to find that the matter has been pursued by several able workers, that many suggestions have been made for the production of these warm tones, and that more are promised us in the near future.

Various Methods of Toning.—Some of the methods that have been suggested had formed the subject of experiment with me, and had been discarded before I hit upon the uranium toning method. Others—some being for the production of the tone by development direct—I had not tried. One of these, published in one of the German papers, and copied into the *Year-book*, seems to rely on the same principle as the method of development I have suggested *preparatory* to toning, the difference being that the developer is still more dilute than what I recommended. But there is another difference which takes the process quite away from what I had done. The tone is obtained by a *second* development, the first being much of the ordinary character, a weak eikonogen developer. The reappearing image presents itself first as a peachy pink, and proceeds through different stages of warm to dark brown.

The action, of course, is very slow; I think you might set it to work in the morning, go to business, and find it not overdone

when you return in the evening. This is roughly the principle which is followed, but you will find full particulars in the *Year-book*.

Another method which is promised, but which has not been publicly shown, comes from America. I saw some prints by this process some months ago, not knowing then that they were not produced by uranium toning. It is now announced, however, that the uranium, or whatever be the color-producing agent, will be contained in paper, or rather in the emulsion. This forms the subject of a patent, and no doubt it will prove a valuable one. The prints I saw were very fine in color. Yet another method is promised us by my friend, Mr. Haddon. He is said to employ a salt of copper, but I have no information on the subject beyond what was stated in the brief notice in the public prints.

The various methods that have been suggested seem to me to be hampered mostly with two drawbacks. First, as a rule, it is difficult to estimate beforehand what tone it is possible to get, or to obtain the same tone at two different times from the same negative. The second is that all these methods are more or less tedious, and this would particularly apply where redevelopment was resorted to. The perfect simplicity of the acid uranium method of toning, the variety of tones obtainable by it, and the power of getting the same time after time, has always appeared to me its special charm. You may be going over your collection of bromide prints, and one may strike you as being too cold for the class of subject. In a few minutes, if your laboratory contain the necessary stuff, you can judge of its appearance in sepia or a warmer brown. If it pleased you better as it was, pop it into running water, and in a couple of hours you will have it as it was.

Working of the Ordinary Uranium Toning Process.—As regards the working of the process, for the benefit of those who may not have heard or seen it described, I will run rapidly through it, but I really do not think that there will be much to add to what has been already published. The first thing, of course, is to get a good negative. One made with lantern-slide work and enlarging in view will save you a lot of trouble. Dense negatives require

long exposures which are difficult to estimate, and seldom, with that, give soft results, develop ye ever so skilfully. As to exposure, the effect you wish to produce will have to be taken into consideration; but, in any case, I recommend a liberal exposure. A print that develops very brilliant—one that has been a little undertimed—will not tone well to the sepia or warm brown. It will be apt to look hard. For red chalk tones, however, which I will allude to hereafter, a stronger print should be produced. But for the present, we are dealing with the sepia and warm browns. A full exposure should, therefore, in my opinion, be given. The developer, again, should be made up to suit exposure and effect desired. I have recommended a dilute hydroquinone developer—say, one part of the mixed solution with two parts or more of water added; or, to put it otherwise, one part each of what we are in the habit of hearing called Nos. 1 and 2, or A and B, and four or more parts of water added.

This will not give a good black and white print. With slow Ilford paper it will give, in some cases, a very fair sepia, but generally a dirty brown. This brown image is the most amenable to the after-toning. With rapid papers you do not get this color. In using them, you must expose and develop so as to get a soft grey image with full gradation. I don't mean the flat grey image resulting from over-exposure. The difference between the slow Ilford and any of the rapid papers under development is remarkable. With the recommended full exposure and dilute developer the image on the slow paper first makes its appearance in a yellowish fawn tint, getting redder as development progresses, and passing on through brown to what appears to be black by canary light. After fixing, this apparent black turns out to be a brown. This is my experience most markedly with hydroquinone, and not so much with para-amidophenol. This yellow and brown appearance during development has made me conjecture that the slow paper might be a chloro-bromide. I have used a sample of para-amidophenol, which was kindly given me by Mr. Sargent, for some trials, and found it very suitable if sufficiently diluted. The development was slow. For producing good black and white bromides, however, it is not necessary to use it so dilute,

but, as the development is very rapid, only the correct exposure is any good. It gives beautifully clear results.

A Developed Brown Image not a Necessity.—The brown image got by development is by no means a necessity. I have only *recommended* it, when working with hydroquinone developer, as being more suitable for receiving the after-toning. What, however, *is* necessary is that a soft and harmonious image be produced. Since the introduction of the phenol developer I have found it very useful for this purpose, and have used it in the form of rodinal almost constantly in place of hydroquinone. It gives a print of great delicacy, of a soft grey tone, and may be diluted for that purpose to form 1 in 100, to even 1 in 400, according to the strength of the negative from which are working, and the effect you wish. Of course, diluted so much as the last figures, rodinal would be useless for producing black and white prints. They would be much too flat, but such an image, you must remember, gives very often an excellent toned print, as the toning agent has a decided intensifying effect.

The prints are, of course, fixed in the usual way, and the after-washing must be very thorough, as the least trace of hypo produces a red stain the moment it comes in contact with the toning bath. "Tae mak' siccar," as we say in Scotland, before toning, I treat the print for five minutes in a bath of—

Peroxide of hydrogen (20 volumes) . . .	1 part.
Water	40 "

and wash again for five or six minutes.

The toning bath may be conviently made up of the following strength :—

Glacial acetic acid	10 minims.
Potassium ferricyanide	½ grain.
Uranium nitrate	½ grain.
Water	1 ounce.

This will not act too rapidly. It may, of course, be made stronger if desired, and I do so on occasions. The prints quickly change color, the sepia stage being reached in a couple of minutes, and five or six minutes, as a rule, being sufficient to get the

warmest brown you would care for. If carried on, the toning will continue till it reaches a heavy black red, and until recently this was the nearest I could get to the chalk-red or Bartolozzi print tint. Within the last few weeks, however, I have discovered a mode of getting much brighter red tones, and this I will describe presently. The toning action may, if you like, be carried on some shades beyond the color it is intended to finish, and the final determination of the stopping point left till the next stage, the washing. But this over-toning, again, is by no means a necessity, although it has been suggested that I have insisted upon it, and that I thereby erected a barrier to its simple working. The print may be taken from the toning bath as soon as the desired color is reached, for the necessary after washing is so slight that very little reduction will occur.

Washing, Drying, and Finishing.—The colored image, or rather the colored deposit on the image, however, is very soluble in water, so that any *too great* redness can be easily got rid of simply by continuing the washing a little longer. When the print leaves the toning bath, the high lights are of a lemon yellow color. Five or six minutes in running water will be sufficient to remove this, and the print is then ready for drying and finishing. If it be, however, still warmer than is desired, the washing will be continued till the color has reached almost what is wanted, some allowance being, of course, made for a little darkening in the drying.

This point being reached, it is important that the print be blotted off in clean blotting-paper or calico till it is surface dry, as, if the moisture be left in patches on the surface, there will be inequality of tone when the paper is dry. This forms a decided drawback to the use of uranium as a toning agent for lantern slides, as it would be sure to spoil a slide to blot it surface dry, unless there is some absorbent substance that could be used for the purpose that leaves no woolly stuff behind it. The use of spirits to expel the water will, no doubt, obviate this difficulty. The omission of the blotting off in the case of paper prints has been the cause of a good many failures which have been referred to me by correspondents. To produce a set of prints, all of the

same depth of color, blot off one at the required color, and set it on a glass plate, or any other clean support, at the side of your washing tank, blotting off the others, one by one, as they reach the same tint.

I may just add a word here as to the mounting of prints. Some enlargements have been submitted to me in which the tone has been considerably reduced at places. This is caused by the prints having been wetted on the surface by the mountant, and allowed to dry in that state. After mounting I always run the print over with a sponge just damp, and in that way secure equal moisture on the surface and even drying.

Chalk Red or Bartolozzi Effects.—This, I think, brings me to the end of the ordinary toning process. It has taken a lot of telling, but in practice ten minutes will do the toning and washing for a print in warm brown. I have now to speak of the chalk red or Bartolozzi print color. To produce this the procedure is very little different. Development should be carried further, so that the faintest details are decidedly out, as the strength of the picture will depend altogether on the color deposit, the unchanged silver being removed afterwards. For this color it is advisable, also, to produce pluckier prints than are used in the brown process, as, if too soft, your deepest shadows are apt to look weak after the silver is removed. When this fully developed image is toned for a considerable time it will have attained a black-red appearance, as shown in the left hand section of this print. This appearance will present itself in fifteen to twenty minutes, but it is desirable to let the action go on for an hour, as, at first, the color deposit is only on the surface, and if the unchanged silver underlying this be then removed the whole of the force in the shadows would be lost. When it is judged that the tone has penetrated the deepest shadows the print is washed in running water for five minutes, or till the acid is removed, and is then immersed in a bath of Farmer's reducer. All the black heaviness dissolves out, and you have left something approaching a red chalk drawing. The hypo is now to got rid of, and to effect this as speedily as possible I again resort to peroxide of hydrogen. A couple of minutes' washing before immersion in this bath, and five minutes after washing, will

have freed the paper from the hypo. The immersion should also be for five minutes. If the high lights now seem to want clearing continued washing will have the desired effect, or, if you are impatient, add a little alkali to the water, and it will reduce quickly enough. If you use washing soda for this, or any other alkali in crystals, see that these are all dissolved before immersing the print, as, if any crystals touch the paper, the color will be removed from the spot in contact almost at once.

For a dark green color, which would give something of a night effect to a seascape, it is only necessary to place a toned print in a very weak solution of perchloride of iron and hydrochloric acid; but this I call playing pranks. I must warn you that it is rather fluky, and you may get a bright blue instead of a green.

I will not say more upon the chemical action involved in the uranium toning process than that a theory has been put forward by Mr. Levy, of the Photographic Club, in which he suggests that the ferricyanide of potassium combines with the silver image and forms a ferrocyanide of silver, with which the uranium nitrate enters into combination. I am not aware whether chemists accept this as the correct explanation, and no doubt the subject may still be forming the subject of investigation. It has, however, been proved by Mr. Haddon that there is no loss of silver when the toned image seems to have been washed away by long subjection to running water, although a bright-red-toned print—one, of course, from which the silver *has not been removed* by Farmer's reducer—may be washed out to a mere ghost. This ghost may be revivified by conversion into bromide of silver, exposure to light, and redevelopment, and may be again toned to any desired color.

Mr. Haddon's Suggestions.—I have now described the process as I am in the habit of working it myself, and at this stage I wish to express my thanks to Mr. Haddon, of the London and Provincial Association, for his recent communication as to a means of improving the working of the uranium toning process. This is the first outcome of the appeal I made for help more than a year ago, for although many have tried to put forward other methods of toning bromides, Mr. Haddon has been the only one to make

any practical suggestion for the improvement of the uranium method. The suggestions made by that gentleman were three: First, that by using an acidulated washing water the loss of tone in clearing the print would be done away with. Second, that by increasing the quantity of uranium nitrate to about five times the amount of the ferricyanide, the precipitate of ferrocyanide of uranium in the toning bath would be avoided, and a saving of precious metal effected; and also that the bath in that condition would be of good keeping quality. The third suggestion had reference only to the chalk red process. To avoid the reduction which may occur in removing the hypo used in that process, he suggests that the silver can be removed from the print by the substitution of sulphocyanide of ammonium and ferricyanide of potasium in place of Farmer's reducer.

To deal with the last suggestion first, I may say at once that I have not yet tried it. But it occurs to my mind that the sulphocyanide will have to be removed from the paper in the same way as the hypo, or if it be left without more than a few minutes' washing, I would like some one who knows to say whether its retention in the print would not set up some combination which might endanger the print. As regards this suggestion, I would say that the difficulty it is designed to obviate is more imaginary than real, as those who will practically work the process will immediately see. The red image, from which the silver has been removed by Farmer's reducer, is sufficiently hard to wash out so as to be very little affected by the amount of washing required to be done in the way I suggest. The full development of the image, in the first place, is not, as suggested by Mr. Haddon, for the purpose of allowing for washing out, but for the purpose of getting decided strength in the weakest detail, as they, when toned and the silver removed, would naturally look weaker in a faint red than they do in the original grey. By using the peroxide of hydrogen the hypo is so quickly eliminated or decomposed that there is little perceptible reduction in tone, and I have not found any one to positively state that the prints will suffer from the hypo eliminator if they have five minutes' washing in running water after they are removed from it.

Comparative Experiments.—Now, as regards Mr. Haddon's suggestion to wash after toning in water acidulated with acetic acid, with a view to removing the yellow stain without reduction of the tone, I have made a comparative experiment to illustrate to you the advantage or otherwise of this suggestion. I submit to you a print which has been toned to a red-brown color, and from which section "A" was cut off and thrown into running water, and there remained for nine minutes, and then blotted off and dried. Sections " B " and " C " were washed in thirteen changes of acidulated water over a period of sixty minutes. Section " B " was then cut off, blotted, and dried, while section " C " was thrown into running water and washed for seven minutes, and then dried.

It will be observed that the yellow stain is not removed from " B," although it has been treated with constant changes of acidulated water for an hour, and that it is only when it has received a further washing of the usual time in plain water that the print is cleared. In the gaslight this is not so apparent as it is in daylight, but you can, I think, clearly see the marked difference between " B " and " C."

Now, on comparison of " B " and "A," it will be observed that " B," which was treated with acid, has decidedly suffered less loss of tone than the section treated only with plain water. This latter, however, I may say, received four minutes more washing than was absolutely necessary to remove the yellow stain, while " B ' was removed from the water the moment the stain was sufficiently removed to make the high lights match with those of those of "A." On the whole, I admit an advantage for this suggestion ; but it is so unimportant, and obtained at the expense of an extra expenditure of time, that, in my own practice, I shall probably content myself with the old method.

And now I come to the suggested alteration in the proportions of the constituents of the toning bath. This alteration is, no doubt, based on sound theory, and it is too soon yet to say whether, in actual practice, it will not result in some improvement. My experiments, however, so far do not give me such satisfaction as I anticipated from Mr. Haddon's suggestion. As you will observe

from the bottle of solution I submit to you, and which has been made up according to the formula given, and used to tone four half-plate prints, there is not that absence of precipitate which was anticipated. There is, in fact, more precipitate than in a bath of the old proportions which has done nearly double the work. It may be urged, of course, that the one contained ten times more uranium at first than the other; but it was with a view to retaining that uranium in solution that this great increase was made. If the alteration be advocated on the score of economy, I think it is very doubtful if the aspirations of its proposer will be realized. The altered bath costs ten times more than the one made by my formula, and, even at that, is not a very ruinous affair, but when it is considered that an eight-ounce toning-bath, made by my formula, will cost for uranium nitrate (2s. 4d. per ounce) exactly one farthing, it is scarcely worth while saving it after it has been used for a few prints. I should think it will be less trouble to put it down the sink. As to the keeping quality of the bath (Mr. Haddon's), my experiments are satisfactory. After keeping for eleven days, I toned a print (the fourth) in quite as short a time as was required for the third. The precipitate, however, further increased, and it is questionable if it will keep sufficiently long in use to do the same proportion of work as could be done by ten fresh baths of the original composition. I have tried a bath of the altered proportions, diluted to the same strength of uranium as my formula; but, although it tones at first exactly the same as mine, it rapidly deteriorates. I have put on the blackboard a table showing the comparative time taken to tone six prints in succession at intervals of half an hour in each of the two baths, from which it will be seen that, whereas the first prints in each were toned to a standard color in five minutes, the sixth prints took respectively twelve and thirty-two minutes.

Table of Results.—These two baths were again tried eight hours later, when the old bath toned its print to the standard tint in eight minutes; whilst the new diluted bath was found to be practically inert. Upon adding, however, sufficient ferricyanide to bring it up to the same composition as my formula, it toned a print in five minutes, and the amount of precipitate, as you will observe,

is very slight indeed. No doubt it will do its work all right still, after a further lapse of forty-eight hours. We will probably try it when giving the little bit of demonstration with which I now propose to conclude this paper.

The following table will show the relative rate of working of the three baths. The time taken to tone a print to a standard color is stated in minutes:

Uranium Nitrate, . . .	5 grains.	0·5 grain.	0·5 grain.
Potassium Ferricyanide,	1 grain.	0·5 grain.	0·1 grain.
Glacial Acetic Acid, . .	30 minims.	10·0 minims.	10·0 minims.
Water, ...	1 ounce.	1 ounce.	·1 ounce.
Print No. 1, ...	2½ mins.	5 mins.	5 mins.
" " 2, ...	3½ "	5 "	5 "
" " 3, ...	5 "	8 "	13 "
" " 4, eleven days later, . .	5 "		
" " 4, ...		10 "	15 "
" " 5, ...		10 "	20 "
" " 6, ...		12 "	32 "
" " 7, eight hours later, . .		8 "	Bath exhausted.

Browning.—A gentleman lately wandering through the streets of London, stopped to look in at a window where photographs were displayed to catch the eyes of passers-by. While staring at the photographs of crowned heads and professional beauties it occurred to him that he would like to have a picture of Browning, of whom he was a great admirer. "Have you any photographs of Browning?" he asked the urbane salesman. "Yes, sir," was the prompt reply. Wondering why the young man made no show of getting them, the customer said: "I should like to buy one; let me see them, please." "They are not for sale, sir," said the young man. "Not for sale! Then what have you got them for?" "To give to 'is friends, sir, not to sell to strangers," the clerk replied, showing some annoyance at my friend's persistence. "This is most extraordinary," said the American, getting angry. "You sell photographs, and I want one of Browning, which you say you have, but you won't sell to me. I should like to see the proprietor and ask him what it means." The clerk stepped up to a fat little bald-headed man sitting at a high desk and said: "Mr. Browning, sir, there's a gentleman as hinsists upon 'aving your photograph, and won't take 'no' for a hanser, sir." And at the same moment my friend noticed the name on the door, "Browning: Artists' materials, etc.!"—*The Critic.*

THE IVES DEMONSTRATION OF THE REPRODUCTION OF THE COLORS OF NATURE.

THIS long-looked for event came off on the evening of April 5th, and proved a satisfactory success, both financial as well as scientific.

Our daily contemporary, the *Philadelphia Record*, gives the following full and interesting account of the demonstration, viz.:

The first public lecture illustrated with specimens of colored photography was delivered at Association Hall last night under the auspices of the Photographic Society of Philadelphia. Scientific demonstrations of the Ives process had been previously made at the Franklin Institute, but these were purely of a scientific nature. The hall was filled to the roof last night by an enthusiastic audience, and every view in colors was received with applause that brought blushes of pride to the cheeks of F. E. Ives, the pioneer of colored photography, who worked the stereopticon end of the lecture from the balcony.

"From Philadelphia to the Grand Cañon of the Yellowstone National Park," was the subject chosen for the lecture. Mr. Ives furnished the colored photographs, while W. N. Jennings furnished the plain photographs, and delivered the lecture. In his introductory remarks, the latter paid a graceful tribute to his co-laborer.

The first views were from plain photographs, but when the first colored photograph was projected, the audience gazed spell-bound. For a moment there was a dead silence. Then as one man the large audience burst into applause that lasted for several minutes. From that moment the success of the lecture was assured.

When thrown upon the canvas the colored photograph is a perfect miniature of nature. No oil painting could possibly produce even an approach to the effect caught in the magic lens of the color camera. The delicate cloud effects, the various tints of foliage and water, the different colors in the rocks, all are perfect. The view of McCartney's cabin, the first hotel established in the Park, is a thorough test. The many gradations of color in the landscape are brought out perfectly. Where the logs of the cabin have been exposed to the weather, they have become bleached, while those in the shelter of the overhanging eaves still retain their natural orange brown color. The grass in the foreground suffers from a lack of moisture, while that in the rear of the cabin, fed by a mountain stream, is a bright, fresh green. Another shade of green is visible in the window blinds, and still another in the dark pines on the hill side. The dark indigo blue of the sky stands

out in bold relief. All the colors of the original landscape and its finest gradations of light and shade are here most faithfully reproduced.

Mr. Jennings' lecture was delivered throughout in a delightfully chatty vein, interspersed with wit and anecdotes of no mean quality. His own plain photographs, many of which were character sketches, added much to the charm of the entertainment, but as he himself admitted, the crowning feature was the perfection of Mr. Ives' experiments with the color camera. The Yellowstone Park was chosen because of its variety of color. The scene from Jupiter's Terrace is full of it. In the foreground is a small pool. In the centre, the water is almost boiling, from which radiate delicate bluish green silken threads gradually running through the scale of color, until at the edge of the pool it assumes a deep purple. The cliffs of Golden Gate afford an excellent opportunity for the reproduction of color in rocks.

"Even the most prominent impressionist," said the lecturer, "wrings his hands in despair as he gazes upon this marvelous mosaic, and frankly confesses that brush and pigment in the hands of the most skilled artist fall far short of doing justice to this masterpiece of nature.

Mr. Ives starts on a two months' European tour next week, partly to obtain views, and partly to accept numerous invitations to lecture before the best known scientific institutions of Europe. Upon his return, he will spend the summer in the Yellowstone Park, which locality, he says, is unexcelled for the purpose of procuring colored photographs. Since last summer's trip he has perfected the color camera, and where previously he experienced some difficulty in reproducing the colors in the water because of the reflection, he will now be able to overcome this difficulty. He expects to return next fall with hundreds of views, even better than those exhibited last night.

World's Fair Note.—The Board of Lady Managers is making arrangements for an extensive exhibit showing woman's share in the illustration of books, in engraving, and other forms of picture production. During her recent visit to New York, Mrs. Palmer consulted with a number of publishers, and received considerable assistance from them. A list of distinguished woman illustrators was secured, and plans set on foot to obtain old volumes and manuscripts illustrated by woman, together with historical data concerning woman's share in this line of work from ancient times down to the present.

The Editorial Dropshutter.

Mr. Frederick E. Ives thus technically describes his patented process for obtaining and projecting pictures in the colors of nature by aid of photography: "By means of a very ingenious compound camera front, three photographic negatives of the object are made by simultaneous and equal exposure, from the same point of view, and upon the same sensitive plate. The photographic plate is sensitive to all colors of light, but by introducing light filters, one of the negatives is made by such light rays only as excite the fundamental red sensation, and in due proportion; another by such light rays as excite the fundamental green sensation, and another by such light rays as excite the fundamental blue-violet sensation.

"From this triple negative a triple lantern slide is made, which, although it shows no color, contains such a graphic record of the natural colors that in order to reproduce them to the eye it is sufficient to superpose the three images, one with red light, one with green, and one with blue violet. This is accomplished either in Mr. Ives's new heliochromoscope, a device about the size of a hand stereoscope, and used in much the same way, or by projection with a special optical lantern, having three optical systems, with red, green, and blue glasses.

"The process is as scientifically accurate for reproduction in color as ordinary photography is for reproductions in monochrome, but at present can be carried out successfully only by a scientific expert employing the photospectrograph for testing the sensitive plates and adjusting the selective color screens. When such preliminary adjustments have been correctly made, the process is almost as simple and reliable as the ordinary negative process. By a modification of the process, introducing further complication, color prints are made on glass or paper; but the comparative simplicity of the plan of superposing images commends it to scientists, and is more convincing to the general public."

Recent Improvements in Platinotype.—A new cold bath paper.—Mr. W. Willis recently read a paper before the Camera Club Conference, in the course of which, after pointing out that the effects of lowering the true temperature of the developing solution in the hot bath process reduced the chances of successful development, brought out defects in the paper, and gave a granular deposit of the image; he said that in 1888 he had attempted to make a paper developable at ordinary temperatures. The cold-bath process, since brought out, had, however, been disappointing, and the hot-bath process had been found more generally useful. They could now develop at much lower tem-

peratures than formerly, 90° being the limit reached. But failures often occurred, due to the low temperature, as rapidity of reduction varied with the different temperatures. We had recently discovered a method of preparing ordinary platinum paper, so that rapidity of solution should not overtake that of reduction, and the image be developed before the salts could be removed from the paper. For obvious reasons, he could not make the process public, but development conducted at a temperature of from 60° to 70° normal temperature gave results equal to those obtained at 130°, free from granularity and other defects. The process had only recently been perfected, but it was completely under control. It might not please his friends of the new school, who did not want fineness of deposit; but more photographs depended for their value on the very quality which the modern school rejected. He showed a number of graduated comparisons between the new paper and the old at various temperatures, the former being much superior in fineness of detail and clearness of line. The ordinary paper was developed at 130°, and the new at 56°. With the latter the ordinary oxalate bath or that containing ortho-phosphate could be used. Development of the new paper was slower than the old, thirty seconds being required before the action was complete. The addition of a small quantity of hypophosphite of sodium gave control to development. Mr. Willis then developed several pictures at a temperature of 64° Fahr. These were much admired. Development in sections failed to produce lines in the picture.

A Novelty in Films.—Advices from France mention a novelty in transparent films for photographic purposes, which it is claimed gives them all the advantages of both glass and films, without any of the shortcomings of either. The new candidate for photographic favor consists of a film stretched over a light metal frame of the thickness of ordinary glass, which improvement allows them to be used in any dry-plate holder having no adapting spring in the back.

The base of these films is not celluloid, and it is claimed they will always lie flat and neither warp nor curl. The development and manipulation is exactly like a glass plate, with the addition of a glycerine bath after the final washing; this consists of

Water	1,000 ccm.
Glycerine	60 ccm.

after which the plates are stood up in a rack to dry.

To obtain a reversed negative, it is only necessary to run a knife around the edge inside of the metal frame.

[The advices received, however, fail to give the effects of our reducing or fixing agents upon the metal frame.—Ed. Amer. Jour. of Photog.]

Photographic Hints and Formulæ.

A Bromide Paper Developer.—There are already about a hundred or more developers by which the image upon a bromide of silver paper can be made to appear in sufficiently varied tints to suit the most fastidious. Dr. Eder, however, recommends another, and offers as an advantage, that with this method the whites remain purer,—a very considerable advantage when we take into consideration the difficulty often experienced in this direction with this kind of paper.

The formula is as follows:

Solution A.

Pyrogallic acid	4 grams.
Metabisulphite of potash	15 grams.
Distilled water	400 c.c.

Solution B.

Carbonate of soda	10 grams.
Sodum sulphite	15 grams.
Distilled water	100 c.c.

For use, take one part each of *A* and *B* and water. It acts very energetically, and can be modified by lessening the quantity of *B*, or altering the amount of water.

Herr Angerer, of the well-known firm of Angerer & Goschl, Vienna, recommends a compound developer which is result of several searches after the very best.

Solution A.

Eikonogen	22.5 grams.
Hydroquinone	7.2 grams.
Potass. Sulphite	150 grams.
Water distilled	1250 grams.

Solution B.

Carbonate of Potash	75 grams.
Water	250 c.c.

A and *B* are to be mingled with discretion, in proportions suitable to exposure, just before development.

M. Max Jaffe recommends the following method of stripping gelatine plates for collotyping with safety: The negative should not be collodionated, but covered with a solution of fifteen parts of gum arabic in one hundred of water. Thereupon a sheet of gelatine, which has been swelled in water, is passed on to it and allowed to dry, whereupon the stripping may take place without danger.

Development of Contact Bromides.—Dr. Braunschweig, in an address delivered before the Photographic Society at Halle a S., stated that in a series of experiments in development of contact bromide prints, he had found Rodinal to be simplest and best; the proportions with which he had obtained superior results were from 1:100 to 1:150; after the image was developed they needed but a good washing, and then the usual fixing.

The simplicity of the process was not alone the great point in its favor, as the manipulation was so completely under control that failure was almost impossible with ordinary care; thus with

(1) Underexposure, it was but necessary to strengthen the developer.

(2) Overexposure, easily remedied by use of diluted old developer.

(3) Flatness, result of exhausted developer, add more stock solution.

(4) Overdenseness, reduce in acid fixing bath.

Ferrotype Dry Plates.—L. Nievsky, in a communication to the *Photographic News*, states that having received several inquiries about the best formula for his ferrotype dry plates, he takes pleasure in putting it at the disposal of the public. The formula is:

Ordinary water (warm)	1 quart.
Carbonate of soda	½ pound.
Sulphite of soda	¼ pound.
Hydroquinone	½ ounce.

2 ounces of 10 per cent. solution of bromide of potassium.
½ ounce of saturated solution of hyposulphite of soda.

Dissolve first carbonate and sulphite, add hydroquinone and bromide, let settle the sediments (impurities) for twenty-four hours; then pour off the clear part and add the hypo.

In very cold weather the development takes from 60 to 90 seconds, in a moderate temperature 40 to 60 seconds, and, when warm, the developer does not want more than 20 seconds to complete fairly exposed pictures. It can be used over and over again, until complete exhaustion of the liquid. I have found that the same formula is excellent for ordinary gelatine plates, and though the developing is slightly longer than with other formulas, the result of a brilliant negative pays with interest the loss of time.

Dr. Jeserich has discovered that the isochromatic plates which he prepares will detect the difference in tint between two different samples of black ink, and shows by his photograph that figures or words in a document which have been added fraudulently to the original can be

thus differentiated from the rest. The first business of the educated forger of the future will be to find out whose ink his intended victim is in the habit of employing.

Rodinal, according to the *Chemische Zeitung,* is prepared as follows:

Potassium metabisulphite	30 parts.
Para-amidophenol hydrochlor	10 parts.
Boiling water	100 parts.
Soda hydrate	q. s.

Dissolve the first two as far as possible in water, and then add slowly a concentrated solution of caustic soda, until the precipitate at first formed is again dissolved, and the solution clear.

Photomicrography.—The importance of modern photography as applied to microscopic objects is forcibly brought out by the following remarks made Prof. Robert Koch, the eminent bacteriologist, who employs photography with great success to bring out the most minute parts of inorganic bodies.

Prof. Koch likens the negative plate to a human eye not blinded by a sharp light nor tired out by long-continued examinations.

"The negative," says Prof. Koch, "frequently shows very fine bodies and parts which are afterward discovered by the microscope on the object itself, but only after very hard work, and under the most favorable conditions regarding light, etc.

"Accurate measurement of but faintly visible objects is almost impossible under the microscope, but on the finished negative the task is rendered comparatively easy. The photographic picture of a great many objects is frequently of more importance than the object itself. If I give to somebody a prepared specimen for viewing certain parts of the same under the microscope, for instance, lymph vessels containing bacteria, then I am not certain that the party has found the right spot, and if this is the case, I am not positive that he is viewing the part under the same light and condition as I did. A photograph, however, gives the microscopic picture exactly in the same light, the same enlargement, etc., as I viewed it at the time of focusing it.

"It is very simple to explain the photograph to a number of persons at the same time, as one can point with the finger to a particular part, or measure it with the compass, or compare it with other similar photographs placed alongside of it,—in short, you can do almost anything in order to come to an understanding."

Photographic Scissors and Paste.

Fluorography is a process of transferring lithographic or phototypic prints to glass by means of fluorated inks, which, in contact with sulphuric acid, disengage hydrofluoric acid, which eats into the glass. The phototype is inked with the following compound:

Soap	50 grams.
Glycerine	200 grams.
Tallow	50 grams.
Water	100 grams.
Borax	25 grams.
Fluorspar	50 grams.
Lampblack	15 grams.

Negatives are taken and transferred into the glass. The latter is surrounded with a border of wax, and covered with sulphuric acid of a density of sixty-four or sixty-five degrees Baume. After fifteen or twenty minutes the acid is poured off, and the glass washed with water and cleaned with a solution of potassa; then washed with water again, and dried with a cloth. According to the *Revue de Chimie Industrielle et Agricole* this is the process that gives the best results.—*The American Art Printer.*

Non-Actinic Glass.—Mr. Franz Wetz, of Klostergrab, Bohemia, has succeeded in making rose-colored and orange-red glass by a new process, one of those that avoid the necessity for reheating the manufactured goods, or "flashing" them with the gold-colored ruby glass. The materials said to be used are selenium, or selenium mixed with sulphide of cadmium, according as the "rose" or "orange-red" color is required. The materials are added to the fluid glass in the melting pot, and color it throughout.—*The Optician.*

Stained Negatives.—Negatives intensified with bichloride of mercury, which have become discolored and useless in consequence of insufficient washing after fixing, may be restored by soaking in a solution consisting of equal parts of the following acid fixing solution:

Sulphide of soda	250 grams.
Water	1 liter.
Muriatic acid	70 c.c.

with ordinary saturated solution of hypo. A bath has been known to remove the strongest discolorations.

THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.

THE annual meeting of the Society was held Wednesday evening, April 13th, the president, Mr. John G. Bullock, in the chair.

In accordance with the resolution passed at the last stated meeting, the appointment of the following Special Committee on Standards was announced: Prof. Benjamin Sharp, George W. Hewitt, Theodore H. Luders, Lewis T. Young, and William H. Walmsley.

The monthly report of the Board of Directors announced the death of four active members since the last meeting, as follows: Messrs. Thomas Hockley, Louis Reichner, Jr., William L. Springer, and William A. Cheyney.

The following persons have been elected to active membership: George W. Morris, James Douglas Blackwood, M. Grahame Hallock, and Allen G. Miller.

At the conversational meeting, March 23d, American Interchange Lantern Slides from Chicago and St. Louis were shown.

The annual report of the Board of Directors was read by the secretary, and was a notable record of the prosperity and usefulness of the Society. The principal events in the history of the Society were recited, among which may be mentioned the following:

April 8th, 1891. *Discussion:* "New Developing Agents." *Paper:* "A Suggestion for a Possible Method of Identifying the Colors Photographed," by J. F. Sachse.

May 13th, 1891. *Demonstration:* Toning of Omega Paper, by C. E. Hopkins (a visitor.)

June 10th, 1891. *Paper:* "On the Preliminary, Secondary and Supplemental Lighting of the Photographic Plate," by J. F. Sachse.

October 21st, 1891. *New Room,* at 10 South Eighteenth St., first occupied for meeting.

October 28th, 1891. *Illustrated Lecture:* "Photography in the Arctic regions," by Prof. Benj. Sharp.

November 11th, 1891. *Paper:* "Preparing strong Ferrous Oxalate," by Caspar W. Miller. *Competitive Exhibition* of Hand Camera Lantern Slides.

January 13, 1892. *Discussion:* The Permanence of the Undeveloped Image on Dry Plates.

January 21st, 1892. *Competitive Exhibition* for Honor Pictures.

February 3d, 1892. *Illustrated Lecture:* "Switzerland,—The High Alps," by C. L. Mitchell, M. D.

February 10th, 1892. *Paper:* "The Fading of Silver Prints," by Ellerslie Wallace, M. D.

February 23d, 1892. *Public Exhibition* of Lantern Slides; the work of members.

March 9th, 1892. *Paper:* "Photographic Objectives," by W. A. Cheyney. *Discussion:* Recent Appliances for the Optical Lantern.

March 15th, 1892. *Illustrated Lecture:* "Picturesque Norway," by C. L. Mitchell, M. D.

April 5th, 1892. *Illustrated Lecture:* "From Philadelphia to the Grand Cañon of the Yellowstone," by Frederick E. Ives and Wm. N. Jennings, with natural color photographic projections.

During the year six members had been lost by death; 34 new members were elected; the total number now on the roll being 200, or about the same as at the date of the last report. In view of the fact that the annual dues had recently been doubled, this fact had been considered very gratifying.

The increased interest and usefulness of the stated meetings was shown in the fact that the average attendance had increased twenty-five per cent. over that of last year.

The Special Committee on Entertainments reported that the three public entertainments in aid of the Home Fund had been very successful, resulting in a net profit of $525.61.

Action on the amendment to the By-Laws proposed at the last stated meeting, to increase the initiation fee of active members to ten dollars instead of five, resulted in the defeat of the resolution.

The election for officers and Directors for 1892–'93 resulted as follows:

President, Joseph H. Burroughs; Vice-Presidents, Edmund Stirling, Charles R. Pancoast; Secretary, Robert S. Redfield; Treasurer, George Vaux, Jr.; Directors, John C. Browne, Charles L. Mitchell, M. D., John G. Bullock, William H. Rau, Frederic E. Ives, Samuel Sartain, George M. Taylor, John Carbutt.

An illustrated lecture was given by Dr. Benjamin Sharp, his subject being "A Trip Through the West Indies," which was followed by a demonstration of the process of making lantern slides with gelatine dry plates. Adjourned. ROBERT S. REDFIELD, *Secretary.*

Mr. Frederic E. Ives requests that the following correction should be made in regard to the discussion reported at the stated meeting of the Photographic Society of Philadelphia on March 9th. He is reported as saying that "ordinary optical is opaque to some of the violet rays," but what he actually said was that it was opaque to some of the *ultra*-violet rays."

In the Twilight Hour.

A FAVORITE has no friend.

TO bear is to conquer our fate.

HE preaches well that lives well.

LEARN the luxury of doing good.

BE wise to-day; 'tis madness to defer.

HONOR and shame from no condition rise.

THE world knows nothing of its greatest men.

THE paths of glory lead but to the grave.

ALL men think all men mortal but themselves.

A THING of beauty is a joy for ever.—*Keats.*

CHARMS strike the sight, but merit wins the soul.

WHERE men agree, their unanimity is wonderful.

A FELLOW-FEELING makes one wondrous kind.

IT is a base thing to tread upon a man that is down.

TO find out one's own folly is the great point of wisdom.

A FOOL must now and then be right, by chance.—*Cowper.*

TO live in hearts we leave behind,
Is not to die.

HE hath a good judgment that relieth not wholly on his own.

THE great end of a good education is to form a reasonable man.

FOUR hostile newspapers are more to be feared than a thousand bayonets.

IT is a species of agreeable servitude to be under an obligation to those we esteem.

A WEAK mind is like a microscope, which magnifies trifling things, but cannot receive greatness.

TO-MORROW.—The day on which idle men work and fools give up their folly, and sinners repent and believe, and reform their character and life.

A FOOL can ask more questions than a wise man can answer; but a wise man cannot ask more questions than he will find a fool ready to answer.

MISFORTUNES are moral bitters, which frequently restore the healthy tone of the mind after it has been cloyed and sickened by the sweets of prosperity.

THAT which is good to be done cannot be done too soon; and if it is neglected to be done early, it will frequently happen that it will not be done at all.

NEVER risk a joke, even the least offensive in its nature and the most common, with a person who is not well bred and possessed of sense to comprehend it.

KIND words are among the brightest flowers of earth; they convert the humblest home into a paradise: therefore use them, especially around the fireside circle.

WHAT is friendship but a name—
A charm that lulls to sleep—
A shade that follows wealth or fame,
And leaves the wretch to weep?

WERE a hundred men asked, who, from small beginnings, have attained a condition of respectability and influence, to what they imputed their success in life, the general answer would be, "It was from being early compelled to think for and depend on ourselves."

Literary and Business Notes.

CRAYON PORTRAITURE, by J. A. Barhydt. 12mo., cloth. Paper, 50 cents; cloth, $1.00. The Baker & Taylor Co., 740 Broadway, New York.

A carefully prepared hand-book for professional and amateur artists, written with special reference to giving such full explanation of details as to furnish to those who desire to take up crayon work a full knowledge of all the materials required and their use and manipulation, together with all the methods and processes employed. The coloring of photographs, engravings and photogravures with liquid water colors and the making of French crystals are also fully treated.

The author's successfully accomplished intention was to furnish a manual that would enable the student, without other instruction, to learn with exactness all he required to know, in addition to some general knowledge of drawing, to enable him to undertake the making of crayon portraits for a livelihood or to gratify his taste as an amateur.

The book is handsomely printed on heavy super-calendered paper, and besides the cuts used to illustrate the text, contains two half-tone plates made from crayon portraits by the author, showing free-hand work, and that on a bromide enlargement, and illustrating the line and stipple effect. Sent, post-paid, on receipt of the price, by Thomas H. McCollin & Co., 1030 Arch Street, Philadelphia.

THE *Californian Illustrated Magazine* for April is beautifully illustrated, over a dozen of its twenty articles being embellished by artistic sketches, making the issue the most elaborately illustrated magazine ever issued west of New York. The success of the magazine has been phenomenal; and beginning with the May number, it will be printed from the same presses as those used by the great Eastern magazines, ordered especially for the purpose; so that the *Californian* will be one of the few magazines in the country having its own plant—a movement which will result in the best pictorial and typographical work obtainable. Among the papers of this issue of especial interest is one by Mrs. Helen E. Gregory-Flesher, A.M., on "The Hairy Men of Japan or Anois," one of the most remarkable and little known races. Mrs. Flesher is the second woman who has made them a study, and her paper abounds in fine illustrations of the people, their homes, and gods. Published in San Francisco. $3 per year; 25 cents a number.

Our Illustration.—An every-day street scene in Philadelphia. Among the most picturesque subjects to be met with in any large city, none are apt to attract the artist's eye quicker than a street mendicant. Mr. James Wood, of the Photographic Society of Philadelphia, has been unusually successful with this class of subjects, as may be seen by the specimen here presented.

American Journal of Photography.

June, 1892.

MADE ON
QMEGA SENSITIZED PAPER.

NEGATIVES BY
SARONY, - NEW YORK.

AMERICAN JOURNAL

PHOTOGRAPHY

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AMERICAN ACADEMY
JUN 27 1892

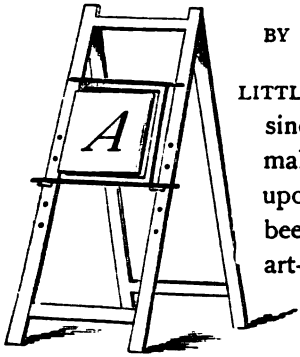
AMERICAN JOURNAL
OF
PHOTOGRAPHY

THOS. H. McCOLLIN, Managing Editor.
JULIUS F. SACHSE, Editor. XANTHUS SMITH, Associate Editor.

VOL. XIII. JUNE, 1892. No. 150.

EARLY DAGUERREOTYPE DAYS.

AN HISTORICAL REMINISCENCE.



BY JULIUS F. SACHSE.

LITTLE more than half a century has elapsed since the introduction of the process for making pictures by the action of light upon a sensitive plate. Yet so great have been the strides of advancement in this art-science of photography within that comparatively short period, that the early processes and the events which marked the introduction of the daguerreotype in the United States have already been lost sight of by all but the few yet remaining who were once interested in the practice or perfection of the discovery.

It is the early daguerreotype days to which the writer wishes to draw attention,—the period extending from the memorable September day in 1839 when the first account of Daguerre's discovery reached America, until the year 1853, which marked the zenith of the daguerreotype process in the United States.

To many a reader at the present day these reminiscences will at first, perhaps, appear somewhat dry and uninteresting, with an apparent excess of documentary detail, which must necessarily be

introduced to substantiate some of the broad claims made to establish the fact that Philadelphia is really the mother city of photography in America. Nor should the fact be overlooked that it was by means of the individual efforts of Philadelphia's investigators and scientists that the defective process of 1839 was perfected and widened out to one of the greatest industries of the day, which now, next to the newspaper, is more widely disseminated throughout the civilized world than any other branch of art, and that the profit and pleasure which is now derived from photography in its widest sense is all, more or less, due to the crude experiments and patient investigations of these almost forgotten pioneers.

Another leading object of this paper is to gather the scattered facts and data from the musty archives of the old scientific institutions which were active in fostering the development of the heliographic art while it was yet in its infancy, and the whole matter was received with doubt and suspicion by the public at large. These fragments, collected under one head and properly classified, together with the recollections of some of the leading daguerreotypists yet living, and other material in possession of the writer, will form a complete historical record of the introduction, development, progress and decline of the first era of heliography, far more exhaustive than any ever before presented to the photographic public; showing the prominent part taken by Philadelphia's scientists and investigators in the development of Daguerre's process in its early stages, and proving the fallacy of the conclusions arrived at in France that the original process as published was but little susceptible of improvement,—in fact, that there appeared to be scarcely any room for alteration, at least to advantage. It is further an interesting fact that Daguerre at first considered it impossible to apply the daguerreotype to the production of portraits,* for with the iodine alone, and the long-focused camera obscura which was first employed, no picture could be taken, even under favorable circumstances, in less than about a quarter of an hour; and as the correctness of a portrait produced by this art depends upon perfect immobility during the whole of the sitting, *the mere idea of such* an

* Claudet, Trans. Soc. Arts, etc., Jour. F. I. Vol. X., 3d Series, p. 50.

application of photography is looked upon as altogether absurd :— thus wrote M. Claudet long after the promulgation of the original process.

Without wishing to detract one iota from the claims which may be justly due to Professors John William Draper and Samuel Morse, of New York, and other investigators in different localities, yet it is nevertheless an incontrovertible fact that, with the labors of Philadelphia investigators, fostered by Philadelphia's scientific institutions, the crude heliographic process of Daguerre was brought to a state of perfection for practical purposes, and thus received the impetus which established the art throughout this country and Europe.

A perusal of this paper, with the quoted authorities, will show

1. That Joseph Saxton, of Philadelphia, made the first heliograph in America, October 16th, 1839.

2. That Robert Cornelius, of Philadelphia, obtained the first picture of a human face by Daguerre's process in the world, November, 1839.

3. That to Dr. Paul Beck Goddard, of Philadelphia, belongs the honor of the discovery of bromine as an accelerator, December, 1839.

4. That Dr. Paul Beck Goddard, of Philadelphia, was the first in the world to obtain an instantaneous picture by heliography, December, 1839.

5. That William G. Mason, of Philadelphia, obtained the first perfect picture in the camera, by aid of artificial light, December, 1839.

6. That the first portrait studio in America, if not in the world, was opened in Philadelphia, February, 1840, at the northeast corner of Eighth Street and Lodge Alley, by Robert Cornelius.

7. That Joseph Saxton, of Philadelphia, in 1841, produced the first photo-mechanical reproduction for use with printers' ink, which combined in its production the daguerrotype, electrotype, and a mechanical process.

The Dawn of Heliography in America.

The first authentic account of Daguerre's process to reach America was a letter written in Paris and sent to Alexander Dallas Bache, a member of the American Philosophical Society of Philadelphia, then the leading scientific organization in America. This letter, which embodied the whole secret then first made public,* was published in the *United States Gazette* Wednesday, September 25th, 1839, with an introduction in which it was stated that some steps of the process are not explicable by known laws.

The Daguerreotype Explained.

The Academies of Sciences and of Fine Arts of the Institute met on the 19th of August last to hear the explanation of the process of M. Daguerre from the perpetual secretary, M. Arago.

It appears that in the earlier attempts to form a permanent picture of external objects by the aid of the camera obscura, chloride of silver was used as in the method of photogenic drawing of Mr. Talbot. In this case the light blackens the paper, the depth of the shade being proportional to the intensity of the light; the lights are thus represented by dark parts of the picture and vice versa. M. Niepce first ascertained that an effect the reverse of that just mentioned might be produced by using a particular kind of

* Vide Am. Jour. of Photo., 1890, Vol. XI., p. 199.

The American Philosophical Society was formed in the year 1769, by the union of two literary societies that had previously subsisted in Philadelphia. One of these, styled the "American Philosophical Society," was instituted in 1743, and at the time of the union consisted of one hundred and twenty-seven members. The other, styled the "American Society for Promoting Useful Knowledge," was instituted in 1766, and at the union consisted of seventy-eight fellows and sixty-nine corresponding members.

The Society was incorporated by an act of the Legislature of Pennsylvania, in 1780.

Aided by the liberal donations of a number of friends of science, both in America and Europe, and by the Legislature of Pennsylvania, the Society was able to erect shortly after the close of the Revolutionary War, their present building upon Independence Square, Fifth below Chestnut Streets. From that time on the Society entered upon an era of prosperity and usefulness until at the time of writing it was the foremost scientific society in America, numbering among its members many of the most noted scientists

bitumen, dissolved in oil of lavender, and that this picture might be preserved. The picture formed upon the bitumen required, to render it fully visible, the use of petroleum, which acted upon the parts of the picture not affected by the light. This process was a very imperfect one, requiring a long time for its execution, and yielding but imperfect results. The invention had been brought to this stage when M. Daguerre undertook to improve it. By many curious experiments and much labor he was gradually led to his present process, the details of which present some very strange, and so far unexplained, phenomena.

A sheet of copper, plated with silver, is carefully cleaned on the silvered side by the aid of nitric acid. The cleansing requires great care and especial precaution, the plate requiring to be rubbed backwards and forwards in a fixed direction. Plated copper is found better than silver.

The plate thus prepared is exposed to the action of the vapor of iodine. For this purpose it is placed in a box upon the bottom of which a small quantity of iodine is strewed, separated from the plate by a gauze screen, so as to diffuse the vapor uniformly. The plate must be closed in a metallic frame, to prevent the vapor from acting more upon the edges than near the centre, the success of the whole operation depending essentially upon the uniformity of the coating of iodide of silver, which is formed upon the surface.

A yellow tint indicates that the plate has been sufficiently long exposed to the action of the vapor. It is then transferred to the camera obscura, carefully excluding it meanwhile from the light. M. Daguerre is understood to have made some improvements in this instrument; to understand the process of the present operation, however, it is only necessary to observe that a plate of ground glass having been previously placed so as to receive a distinct image of the object to be delineated, the prepared silver plate is substituted for it. The effect is immediate, but is only very slightly perceptible.

philosophers, students, and theologians in Europe as well as America.

The library of the Society is large and valuable, as is also the museum and the collection of manuscripts. The hall of the Society, built in 1785, has lately been enlarged, and made strictly fire-proof. The picturesque "bit" shows a nook in the old hall prior to the late alterations.

The plate is next exposed to the action of the vapor of mercury, and a condition stated to be essential is, that it shall be placed under a particular angle. It is, therefore, placed in a second box, at the bottom of which is a small trough of mercury, heated to between 160° and 170° Fahrenheit, and if the picture is to be viewed when hanging vertically the inclination of the plate to the surface of the mercury must be 45°. The vapor of mercury appears to affect only the parts which have been already acted upon by the light, forming probably an amalgam of mercury and silver. After this operation the plate is dipped into a weak solution of hyposulphite of soda, and then washed with distilled water. The process is now complete, and the plate presents a drawing in which the light and shade is truly represented, and which may be exposed without change to the action of light.

This account was republished in the proceedings of the Franklin Institute* for September, 1839, without notice or comment, but was followed in the next number (October, 1839, p. 287) with an account from *Galignani* of three street scenes in Paris taken from Daguerre's atelier, which were exhibited before the Chamber of Deputies at a meeting subsequent to the one held August 19th. This notice further stated that

The chemical substance upon which the light acts, according to M. Daguerre's method, is laid upon sheets of copper which, for the drawing exhibited on Saturday, were about 9 or 10 inches by 6 or 7 inches. The cost of such plates M. Daguerre estimates at about three francs or fifty cents each, but he expects that considerable reductions may be ultimately made in their cost, and that the improvement of his method will render it applicable to other substances not metallic.

A Nook in the Li rary.

Notwithstanding these repeated notices of the heliographic process, no action whatever was taken upon the subject by the scientific institutions, as the published accounts were thus far looked upon as unworthy of serious consideration.

* The Franklin Institute was founded in the year 1824, the purpose of its originators being to found an institution for the promotion of the mechanic arts, at that time in their infancy in this country. From the period of its establishment to the present, it has actively and honorably fulfilled its mission,

A few weeks later, however, a more detailed account of Daguerre's process reached America; this was from an eye-witness, a special correspondent of the *New York Star*, who was then in Paris, which was published in that paper October 14th, 1839. This letter gave an account of the public demonstration given by Daguerre on the 17th of September at the Grand Hotel on the Quay d' Orsay.

So skeptical were the Parisians of Daguerre's claims, and so great was the popular opposition to the grant made by the Deputies to the inventor, that to silence public clamor the Minister of the Interior ordered Daguerre to give three public demonstrations of his process, so that the interested public might judge whether the Chamber of Deputies were justified in giving the pension to Daguerre for the disclosure of his discovery. Admission to these exhibition was by tickets to be obtained free of cost. Yet so great was the interest taken that the supply of tickets was soon exhausted, after which many were sold by those who had been fortunate enough to obtain them in the first instance, the prices realized ranging all the way from ten to one hundred francs. It was the first of this series of lectures which the New York *Star* correspondent attended and described in detail.

Three days after the publication in New York the article was printed in the *American Daily Advertiser* for Wednesday, October 16th, 1839, published in Philadelphia by Zachariah Poulson at 106 Chestnut Street,—viz.:

He [Daguerre] took a plate of copper plated with silver, and rubbed the silver surface in a slight manner with very fine pumice powder and

and has been closely identified with so many measures for the encouragement and growth of the arts and manufactures, that no history of American industries would be complete which omitted to record its service.

Associated with its past history are the well known names of Merrick, Ronaldson, Keating, Baldwin, Bache, Agnew, Espy, Harrison, Johnson, Mitchell, Patterson, Frazer, Cresson, Rogers, and many others of equal prominence: while its roll of membership to-day embraces the names of all who are identified with the learning and industries that have given Philadelphia her leading position among American cities.

The hall of the Institute is a large and substantial structure of blue stone, situated on the east side of Seventh Street, midway between Market and Chestnut Streets. The corner-stone of the building was laid in the year 1825, and it has been occupied by the Institute to the present time. The extensive and very complete library of the Franklin Institute is one of the most valuable libraries of reference upon scientific and mechanical subjects in the United States. For this purpose it is accessible to the public, and visitors from all parts of the country constantly consult its shelves.

sweet oil, using small balls of cotton wool for this purpose. He thus completely dulled the surface, and I noticed that he rubbed first with a circular motion and then with straight lines from top to bottom.

He then washed the plate thus dulled in a liquid consisting of

Distilled water	16 parts.
Nitric acid	1 part.

He then gave a slight heat to the plate by passing it over the flame of a lamp,—the copper side being next to the flame and the silver surface uppermost. He then washed it a second time in the dilute nitric acid.

The plate was now ready for a coating of iodine. The apartment was darkened, and the plate, fixed on a small board, was placed (with the silver part downwards) over an opening the size of the intended picture, in the lid of a box at the bottom of which the iodine was. Half way down in the box was a slight wooden frame on which a piece of muslin was strained, and through this muslin, as the iodine evaporated, the fumes rose, and were thus equally received upon the silvered surface, thus forming a coating of iodine of silver, having the yellow appearance of brass.

A camera obscura was now brought up. Its focus had previously been adjusted by trying the effect of the picture on a bit of ground glass. The plate prepared as above was placed in the camera. The view intended to be taken was the Tuileries, the Quay and the Seine in front of the window where the camera obscura was placed. It was there to remain until the action of the sun's rays on its surface was sufficient. This occupies a period of from five to forty minutes, according to the time of year and state of the weather, and as the director (for I cannot call him the operator) cannot see by the plate how

The upper floor is entirely devoted to the use of the large drawing classes composed of young men and women pursuing studies in mechanical, architectural and free-hand drawing.

The rapid growth, of late years, of the library and schools of the Institute, has taxed the ingenuity of its officers to the utmost to carry on its work effectively, the accumulation of books, models, instruments, etc., having become so great as to make it almost imperative to secure more ample quarters. In the collections of the Institute are some interesting historical relics, among which may be named the original electrical machine of Dr. Franklin, Godfrey's original quadrant, an original telegraphic apparatus of Morse, models of Oliver Evans's high pressure engine, and others of less importance.

The Franklin Institute signalized the earnestness of purpose of its founders in promoting the mechanic arts, by holding in the year of its foundation the *first exhibition of American manufactures* held in the United States. This historical event occurred in the

the process goes on, experience alone can tell him how to judge as to the advancement which the action of light has made. In this instance the day was dull, and the plate remained fifteen minutes in the camera obscura. When it was taken out it appeared exactly the same as when it was put in, and the people looked very blank, I do assure you, at what looked like a failure; but indeed one could scarcely tell whether or not it had been marked, for the process requires that no light should fall on it before the finishing operation.

M. Daguerre took the plate and held it with the silver part downwards, and thus held it for half a minute, while three persons peeped upon it and said, "Nothing has been traced upon it."

He fixed it then, at an angle of 45°, in a box at the bottom of which was an earthen pan holding two pounds of mercury. Under the pan was a lamp which heated the mercury to 62° Centigrade or 117° Fahrenheit, and as the mercury grew hot its globules arising [that is, its fumes arising] combined with the prepared surface of the metal, *brought out the picture.* In front of the box is a glass spy hole, through which the process was watched, and the moment it was completed the plate was taken out and washed with distilled water saturated with common salt or with hyposulphite of soda, heated a degree below the boiling point. This finished it, and the picture, thus literally executed by the sun, was handed about.

I never, continues the correspondent, saw anything more perfect. When examined by the naked eye every object appeared minutely engraved, but when viewed through a magnifying glass the difference of grain in the separate flags on the *trottoir* was visible, and the texture of everything, if I may use the phrase, was easily distinguishable.

The time occupied by the whole process was 72 minutes, which is much more than I had been led to expect.

(*To be continued.*)

year 1824, in the old Carpenters' Hall, in Philadelphia, and was crowned with complete success. To use the words of a historian of this event, "it attracted large crowds of people, who hitherto had had no conception of the extent and variety of our home productions, and served in many curious and unexpected ways to bring producers and consumers together, and to diffuse a knowledge of our domestic skill and resources."

The Institute commenced in the year 1826 the publication of a journal devoted to science and the mechanical arts, which has had an uninterrupted existence to the present day. It contains the records of the scientific work of the Institute, besides many valuable contributions respecting the growth of American industries, and the progress of science and the useful arts during the past half century. It is highly esteemed at home and abroad as a standard work of reference. It is to this journal that frequent references are made during the course of this paper.

THE WET COLLODION PROCESS.—III.

BY ELLERSLIE WALLACE.

THE silver bath into which the collodionized plates are dipped in order to convert the salts in the collodion into the sensitive material required, is merely a solution of pure nitrate of silver in pure water. The average strength is forty-five grains of the nitrate to each ounce of distilled water. It is the custom, however, to add a minute amount of pure nitric acid in order to make the plates work cleaner. A good rule for this latter addition is to begin with *one drop* of the C. P. nitric acid *for every ounce* of nitrate of silver crystals. If this small quantity, which barely reddens blue litmus paper, is not enough, more may be cautiously added until the blue paper turns rather quickly.

The water of which the bath is made should either be distilled, or good spring or river water might be used. No foreign matters, such as oil and iron rust in the condensed water from steam-engines, or lime salts in "hard" water, should be present. The silver bath is kept in a covered glass trough, sold by dealers for the purpose, and should not be exposed to white light. The trough, as well as the "dipper" used for lowering the plates into the solution, is well washed and cleaned before pouring in the silver solution.

The operations of coating the plates with collodion and dipping them into the bath are perfectly simple and easy when once understood, but it is almost impossible to give lucid directions for them in writing. Those who know nothing of these operations should see them done by some good photographer before attempting them for themselves. I will now try to give an idea how to do them.

The bath is supposed to be standing ready on the table in the dark-room, the dipper being in the trough in readiness to take the plate. The collodion being in a four- or eight-ounce glass-capped "pourer" is supposed to have the right age, and to be perfectly bright, clear and free from sediment. The albumenized glass is in

* Continued from page 197, Vol. XIII.

a box on the table conveniently near to the collodion and the bath. The operator has the door of the dark-room under convenient control, so as to darken the room the moment the plate is dipped into the silver bath. It is always best to leave the door open until after the plate is coated. Plenty of light is required for this operation, and there is a better opportunity for the escape of the fumes of the collodion.

Standing in the doorway with his face towards the light, the operator folds up a piece of clean blotting-paper about two inches square, and carefully lifting out a clean glass from the box, he holds the glass with its albumenized side uppermost with his left hand by one corner only. The square of the paper is applied under this corner, so that the four fingers of the left hand support the plate *without touching it.* The thumb just touches the extreme of the corner at the top.

Having seen that the surface of the glass is free from dust, or having *very lightly* passed over it with a wide camel's-hair blender, the collodion is poured steadily on, circled over the plate and the excess returned to the bottle; the plate being meantime rocked to and fro until the collodion ceases to drip off and becomes congealed. When the lower corner of the plate will receive the impression of the tip of the finger without sticking to it, the dark-room door is promptly closed and the plate set on the dipper, which is raised from the bath for a moment. They are then firmly lowered into the solution. Any stoppage in the act of dipping the plate will make an ineffaceable mark. The plate is now gently moved about sidewise in the solution without letting its top project above it; after a few moments it is left undisturbed. The plate-holder is now got ready; the developer poured out into a suitable glass or measure for developing; the fingers rinsed in water and dried; and then the plate lifted by the dipper and examined. If the bath solution runs off from the plate in a greasy manner, the plate is again lowered and churned about for a moment until its surface, when lifted, is perfectly smooth. It is then taken off the dipper, held for an instant to drain, and set into the holder.

It is now ready for exposure in the camera, after which it is developed. No time must be lost, and every preparation for ex-

posure and development must be made before removing the plate from the bath. It will do no harm to leave the plate in the bath for even half an hour, while posing the subject or making other preparations, but it is better to remove it in, say four to six minutes.

On opening the plate-holder in the dark-room after returning from the camera, the upper edge of the plate is seen to be beginning to dry, while the lower corners are yet quite wet, and stand in two puddles of silver solution which have accumulated during the time of absence from the dark-room. The plate is carefully lifted out by the upper edge and rested for a moment on a clean piece of blotting paper, which absorbs the excess of solution at the bottom. If these drops were not removed, there would be marks made when the developer was applied.

The operation of developing a wet collodion plate is by no means as easy as that for the dry plate, and requires skill and neatness. The developer being handy in a convenient vessel, the plate is held in the left hand in the same position as when the collodion is applied, and the developer gently flooded over the film in an even sweep. It must flow quite freely, and cover the film to all four corners at once. If the plate has been kept long out of the bath in hot weather, so that the film dries a little, it will be exceedingly difficult to force the developer all over the film at once. The slightest check in the flow makes a peculiar curved mark that cannot be removed. But ordinarily there is no trouble in covering the plate well, if the film is not dried and if the right amount of solution is used. I allow myself one ounce, by measure, for plates 8½x6½ inches, and rather less than two drachms for 4¼x3¼. It will never do to use large quantities of solution and swill the free silver off the film into the sink; nor on the other hand ought any risk to be taken of not covering the plate fully by using too little bulk of fluid. The image of the collodion picture being built up of metallic silver which is deposited by the developer from the free nitrate of silver on the plate, it is manifest that too much developer washed over the film would remove the free silver which is indispensable to the forming of the image.

The developer for wet collodion plates is a solution of sulphate of iron in water of about thirty grains to the ounce, with sufficient acetic acid No. 8 added to keep the shadows clear and to make it flow smoothly over the film, say one-and-one-half drachms to the ounce. In hot weather it need not be so strong. A good working formula is:

Sulphate of iron, ...	800 grains
Acetic acid No. 8, ...	6 ounces
Soft water, ...	26 ounces

These developers are most active when freshly made up.

The light over the sink where the development is conducted should be low down, so that the plate can be watched through the film as well as by its upper surface. The development of a well-timed collodion plate should be quite done in from forty to sixty seconds. The plate is gently rocked while developing, and the density increases very rapidly. When nothing more appears, and *before* the image becomes "burned up," as in dry plate development, the plate, without draining, is laid under the tap and thoroughly washed.

If, when examined, the image is too thin, more density may be thus given: After well washing drain and apply

A—Nitrate silver	20 grains.
Water	½ ounce.
B—Citric acid	30 grains.
Water	½ ounce.

Mix A and B together and filter. Use only enough to just creep over the film (say 1 drachm for 8½x6½; then re-apply the developer and note the changes in intensity which take place very quickly. Wash the plate and fix in a fifteen grain solution of cyanide of potassium. Finally wash the plate, set it up to dry, and varnish.

Cleanliness.—Every utensil should be cleaned immediately after use. If left in a dirty condition it becomes more difficult to clean, and takes labor and time usually when we least can spare it.

PHOTOGRAPHIC PRINTING.

BY XANTHUS SMITH.

TO those who have an intimate knowledge of photography, and a love for the art as presented to us in its higher attainments, no apology need be offered for our having a few words to say upon the subject of the manner in which the very important process of printing is conducted.

We are inclined to think that a large number of amateur photographers, and a good many professional also, do not devote near enough attention to the matter of making or securing good photographic prints.

The securing of a good negative generally occupies a large share of attention, and it is proper that it should be so, but when one sees the injustice that is done many fine negatives in the way in which prints are made from them, one cannot help regretting that with all the pains that is bestowed upon the first step, namely, the making of the negatives, the negative and the art are not considered worthy of the bestowal of the full meed of pains which the difficult art of photographic printing requires.

We have said difficult in reference to photographic printing, not because the production of a fine silver print necessitates any remarkable ability or even capacity in the manipulator, but because it seems to be difficult to fall in with many who are really capable of conforming with that painstaking nicety to the details which are required to produce the highest class of work.

Apart from the risks run, in encountering the varying qualities of the paper, etc., furnished by manufacturers of photographic materials, all that would seem to be required in the making of good prints is a painstaking thoroughness, which is not met with in every individual.

The majority of amateurs, it stands to reason, will not tax themselves with the work, following the pursuit, as is frequently the case, more as a mere sport than anything else, and certainly we know that while there is a great fascination connected with the developing of a plate, the real sport of photography lies in

the search for subjects and the firing at them; and so many of the professionals are dependent solely upon their employees for the fulfilment of the printing, and knowing how rare it is for subordinates to carry out with with conscientious nicety the directions of their employers, it is really no wonder after all that such shortcomings are noticeable in the photographic prints which daily come under our observation.

It is true that many amateurs have neither the time nor proper conveniences for producing good prints, and of course such must be content with the best which they can get done for them by the trade.

We would simply draw the attention of such as have the means of doing their own printing to the importance of devoting sufficient pains to the art to produce really perfect prints. The requirements would seem to be principally to secure the very best of paper, to have the silvering bath in perfect order, and, in addition to care about the principal details of fuming, printing, washing, toning and fixing, and subsequent or final washings, to be scrupulously particular about all the trifling precautions, such as the avoidance of dirt, of air bubbles, the proper dryness of the paper at the various stages, the use of pads in the printing frames, and extreme cleanliness of the trays and even of the fingers throughout all the stages.

It is a fact not always at once recognized that the finest prints are often made from what are called thin negatives.

Such negatives as those which result from under-exposure, wherein the lights are very dense and the shadows clear or nearly clear glass, are not the ones that require such care and skill in the printing to produce fair prints. A negative of this description will make a brilliant print with any mode of printing, whether it be silver, platinum, or even blue print. When we come, however, to deal with those negatives that are filled with delicate gradations of half tone, those delicate supporting shades for the high lights and corresponding supporting tones for the deepest shadows, the printing must be of the most brillia nt kind that can be secured Poverty in albumen, in silver, in gold, over-toning, over-soaking, all must be avoided, or we have poor, weak, flat, poverty-stricken

prints, instead of those rich and at the same time refined, delicate pictures that look as though they had been breathed into existence by some fairy stroke.

Those who have the opportunity of inspecting the beautiful work exhibited in the show cases at the entrances to the leading photographic galleries in the large cities may realize the capabilities of the art of photography in its perfection, and they will perceive how much is due in a fine photographic work of art to refinements in the printing processes. I speak here especially of the capabilities of the art, because it must not be supposed that all the work resulting from the daily routine of these places is equal to that which is displayed in the show cases. It would be too much to expect that it should be so. Even with the most favorable conditions of skilled and careful employees, and the constant supervision of an able head, the art is not so certain in its results as to accord an even tenor of success, but the best results cannot be looked upon by any one practicing the art from a love of excellence as other than a source of the highest emulation.

In connection with this subject, one cannot help frequently recurring to the thought that it is very remarkable that photographic printing should have been so nearly at a stand-still since it jumped into existence more than thirty years ago. Paper coated with albumen, sensitized with nitrate of silver and toned with gold forms a unique process, which is remarkable because the materials are so peculiarly adapted to each other, and the whole to the end to be attained, that, with all its faults and uncertainties, no means seems to be attainable that will rival the albumen printing for the mass of photographic work.

When we think of the immense advance that was made in photography by the invention and perfection of the bromo-gelatine dry plate, and the efforts that are being made with the aid of advanced scientific knowledge to discover a means that will give us, in a simple manner, absolutely permanent prints, equaling in every way the beautiful negatives which are now so easily made, does it not seem strange that we are still plodding in the old rutty road of albumen printing?

AMERICAN JOURNAL OF PHOTOGRAPHY,
JUNE, 1892.

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PHILADELPHIA HARBOR.

SHOWING THE ISLANDS NOW BEING REMOVED BY THE UNITED STATES.

MAJOR C. W. RAYMOND, CORPS OF ENGINEERS U. S. NAVY IN CHARGE.

NEGATIVE AND PHOTO-ENGRAVING BY
FREDK. GUTEKUNST, 712 ARCH ST., PHILAD'A.

NEGATIVE ON TRANSPARENT FILM.
ENGRAVED EXPRESSLY FOR AMER. JOUR. OF PHOTO.

Those who are pushing the [illegible] processes, and the in-coming [illegible] say, "Have we not [illegible] it, and [illegible] under the most favorable conditions, it must [illegible] be beautiful [illegible] can be [illegible] by the [illegible] who would much rather have an indifferent [illegible] [illegible] and point [illegible] to the promise [illegible] by a [illegible], it [illegible] at [illegible] the process.

[illegible] the matter of permanence is [illegible] the [illegible] the photo-reproduction processes [illegible] too large that the most is to be looked [illegible] that [illegible] expense connected with the most [illegible] [illegible] them beyond universal use.

PHOTOGRAPHY IN NATURAL COLORS

With surprising regularity we are called upon month after month to chronicle the solution of the color process. These [illegible] accounts almost in every instance find their way into the secular press. The designing individual pours the account of his discovery into the willing ear of some news-gatherer connected with one of the great dailies. The reporter, who knows nothing whatever about photography, writes up [illegible] article, [illegible] the [illegible] of his informant as an accepted fact and thus the news is scattered broadcast over the world.

This time it is Dr. Vogel of Berlin who [illegible] and [illegible] with cool indifference, and claims everything for himself. Dr. Vogel by this time has without doubt seen the accounts of the practical results in color photography as publicly shown by Frederick E. Ives of Philadelphia, and who is now on his way to England to demonstrate the process practically before the Royal Institution of Great Britain. If Dr. Vogel or his son [illegible] any practical results in this line, none would be more ready to show results than the aforesaid two Vogels, without waiting for the summer to come.

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PHILADELPHIA HARBOR.

SHOWING THE ISLANDS NOW BEING REMOVED BY THE UNITED STATES

MAJOR C. W. RAYMOND, CORPS OF ENGINEERS, U. S. NAVY, IN CHARGE

NEGATIVE AND [illegible] ENGRAVER [illegible]

FREDK. GUTEKUNST, 712 ARCH ST., PHILADA.

[illegible] ARENT FILE

[illegible]

Those who are pushing the merits of the platinum and bromide processes, and the in-coming gelatine and collodion papers, will say, " Have we not found it? " But, alas, it has not been found.

Under the most favorable conditions, it must be admitted, that very beautiful prints can be made by the platinum process, but who would not much rather have an indifferent silver print than a poor platinum print, and as to the bromide process, while it fills admirably a certain place, it cannot at all take the place of the albumen process.

When the matter of permanence is given the larger share of consideration the photo-reproduction processes seem to give rise to the hope that the most is to be looked for in that direction, but the care and expense connected with the most highly perfected modes put them beyond universal use.

PHOTOGRAPHY IN NATURAL COLORS.

[WITH surprising regularity we are called upon month after month to chronicle the solution of the color process. These interesting accounts almost in every instance find their way into the secular press. The designing individual pours the account of his discovery into the willing ear of some news-gatherer connected with one of the great dailies. The reporter, who knows nothing whatever about photography, writes up a sensational article, accepting the vagaries of his informant as an accepted fact, and thus the *news* is scattered broadcast over the world.

This time it is Dr. Vogel of Berlin who ignores all and everybody with cool indifference, and claims everything for himself. Dr. Vogel by this time has without doubt seen the accounts of the practical results in color photography as publicly shown by Frederick E. Ives of Philadelphia, and who is now on his way to England to demonstrate the process practically before the Royal Institute of Great Britain. If Dr. Vogel or his son had arrived at any practical results in this line, none would be more ready to show results than the aforesaid two Vogels, without waiting for the summer to come.

However, as Vogel's explanation is published after the Ives demonstration reached Germany, we may perhaps see some of Vogel's results after Ives has shown the world how to do it in his exhibitions in London. As we stated last month, the individual who discovers any progress in this line will show results first, the same as Mr. Ives is doing. The description of how it is done is an after consideration.

Every intelligent reader of any photographic periodical will at once recognize the fallacy of this new manifesto of the Vogels *pere et fils.*—ED.]

PROFESSOR VOGEL CLAIMS TO HAVE REPRODUCED THE NATURAL TINTS OF OBJECTS.

If Professor Vogel, the distinguished Berlin chemist, is not mistaken in the conclusions to which his experiments have led him, another one of the great scientific problems of the age would seem in a fair way to solution.

Professor Vogel, whose past career should be a warrant for his earnestness, assures me that he has now perfected a process by which it will be possible for skilled operators to reproduce the natural colors of animate and inanimate objects by photography.

The scientist who claims to have invented the process which is to accomplish this marvel is a man well on towards the sixties, of middle height, broad-shouldered, bearded, and bespectacled. He has paid several visits to America, and has been in frequent communication for years past with Professor Rowland, of Baltimore, and the other American scientific lights.

It was originally his intention to accept a post which has been offered him at the Chicago World's Fair. But his health is poor, and his son will probably go over in his stead.

At Professor Vogel's invitation I called at the workshop in which with his partner, Mr. Ulrich, he has lately been tentatively applying his process to lithography.

I asked the Professor whether he was convinced that he could photograph people in natural colors as perfectly as he could reproduce pictures.

He assured me repeatedly and in the most positive manner, both in speech and—at my request—in writing, that he could.

"I have not yet practically demonstrated the fact," said he, "because it is only lately that I have perfected my process, and the

light in Berlin has not been favorable to my experiments. I shall test my invention early in the coming summer, when the light is more brilliant. To do so now would be impossible, and for this reason—we need three plates of each subject, instead of the usual one. Subjects must sit three times without moving, and satisfactory plates could only be obtained in the summer."

"Can you give me some idea of your process?" said I.

"Well, partly," said the professor, "but I must preface my explanations by reminding you that, so long ago as 1865, Cros and Ducos du Hauron Frères, of Paris, tried to reproduce natural colors by photography. To this end they took three negatives through three glass screens—one blue, one red or orange, and one yellow—which they copied on three collotype plates. These three plates were then printed in color on the same piece of paper, the tones of color chosen being always those which had not acted upon the negative, just as ordinary black photographs are printed from plates on which black has not acted.

"In 1873 I introduced certain improvements in the process, with which Ducos du Hauron and Albert, of Munich, made further experiments. But the colors reproduced were unnatural, as the proper complementary tones were not employed in printing.

"On thinking over the matter I perceived that these true complementary colors could only be obtained by spectroscopy. I evolved the principle that the printing dye should be the same as that used for making the plates sensitive."

I hear that the Russian government has offered Professor Vogel 300,000 marks for the patent of his invention.

He has so far declined to take out patents, though, as yet, he objects to describing certain details of his process.

The memorandum in writing furnished by Professor Vogel to our Berlin correspondent and mentioned above is translated almost literally as follows:—

Photography in natural colors (as invented by Professor Dr. H. W. Vogel) was first suggested in 1865, when Cros and Ducos du Hauron Frères, in Paris, undertook to fix by photographic process natural colors, using three negatives for every picture, taken with a red, a yellow, and a blue glass. The three negatives so obtained were copied on collotype plates, and from these pictures were struck off by the use of printing inks, representing the complementary color to the color of the glass through which the negative had been taken. To print from the green glass collotype plates, red printing ink had to be used; to

print from a blue glass collotype plate, yellow dye was necessary. In short, to print from any of these collotype plates a dye was to be used of a color which had not acted on the corresponding negative plate, in strict analogy with common photography, by which a picture is printed in black from a negative on which black has not acted. This principle could not be successfully employed until 1873, when it was my good fortune to invent orthochromatic plates, that is, plates sensitive for red and yellow, the plates (by using a coating of bromide of silver) having been already made sensitive for blue. Ducos du Hauron, in Paris, and Albert, in Munich, first experimented with these plates.

But the colored pictures they reproduced seemed unnatural because they didn't understand the real complementary dyes. They took what seemed to be the best.

As I began to think over the matter I recognized soon that only by the spectroscope would it be possible to find out the real complementary color, and I published as early as 1885 the principle, *i. e.*, the printing dye, the same as the dye used by me for making the plates red or orange-sensitive, yellow or yellowish-green sensitive, etc.

It must be kept in mind that all the color-sensitive plates I made I prepared by the addition of certain dyes to the bromide of silver plates. For example, the blue cyanide makes the plate sensitive for orange or orange-red, and therefore the collotype plate prepared after such plate must be printed by cyanide or some other dye spectroscopically similar to cyanite.

In the same way the plate sensitized by eosine for yellow-green delivers the red collotype plates, which must be printed by eosine, etc. The plate sensitive for blue is printed by a yellow dye mentioned and published by me already in 1885 in my book. Mr. Ulrich, a chromo-lithographer, had proven first that this principle is right.

My son has improved the process by selecting the right dyes for coloring the plates, the right color-screens and the right printing dyes exactly corresponding with the matter for dyeing the plates to make them sensitive to the selected colored rays.

Experiments with oil and other paintings of the best masters—as Menzel, Knaus, Graeb, etc.—have proven that it is possible to reproduce the real colored pictures in the right colors.

We can in eight days do the work which, as done after the ordinary old chromo process by twenty polychromic stones, now takes about two months! And we are requested by the great art establishments of Germany permission to make the first use of the process.

We employed it at first for art and art-industrial reproductions instead of ordinary chromo-lithography. But we are beginning to reproduce landscapes and portraits in the summer season when light is improving.

The reason is that we want three plates instead of one for each persons, and these can only be had a short time in the summer. Every person must sit three times without moving. That is difficult.

Several other investigators may have tried to get simllar results after the old process of Ducos du Hauron. But I have seen nothing similar to ours in truth, because all have ignored the spectroscopical principle above mentioned.—*New York Herald.*

HOW PAPER IS SIZED.

THE gelatine used for sizing the better classes of writing papers is precisely the same as that so well known to culinary art, remarks Mr. Arnot in his dissertation on the paper-making industry as commonly carried on in Great Britain. It is the soluble portion of hides, bones, horns, and hoofs, and is extracted from these substances by warm, but not boiling, water in copper steam-jacketed vessels. The raw material most largely used by the paper maker for the preparation of animal size is what is known as "scrows," which are the pieces trimmed off the hides previous to tanning. These parings may be used fresh, but usually the source of supply is distant from the mills where they are consumed, and this renders it necessary to cure them so that putrefaction may be prevented.

The curing is effected by means of lime, and before the "scrows" are treated for the extraction of gelatine the adhering particles must be removed and the material itself softened by steeping in cold water. When the "scrows" are quite free from lime, and indeed restored very much to their original condition, they are put into the copper vessels and dissolved. From five to seven per cent. only of the original weight remains in the form of slime when all the gelatine has been removed.

To effect the complete removal of the gelatine, two or three successive solutions have to be made, and these are run together

into tanks or vats, through strainers designed to keep back slimy and other impurities, which would impair the brightness or otherwise injure the character of the size.

The temperature at which "scrows" should be treated so as to get the gelatine in its purest condition, varies according to the character of the "scrows" themselves, some varieties requiring a higher temperature than others. It may be taken as a general rule, that the finer the material is, the lower the temperature that will suffice, and the product will be purer. Inferior "scrows" are more difficult to dissolve, requiring a higher temperature, and besides, they do not yield such a pure size. About 140° Fahr. should be sufficient for the finer sorts, and from that up to 180° for inferior qualities.

A very small percentage of gelatine dissolved in water will, on cooling, become solid, but a comparatively short exposure to atmospheric influences, especially in warm weather, will cause it to putrefy and become liquid. To prevent this occurring on the large scale, alum is added to the gelatine shortly after it has been discharged from the dissolving vessels. The immediate effect of the alum is to thicken the size; but the element of acidity is also introduced, as the alum has naturally an acid reaction, and this is no doubt prejudicial to the paper treated. To neutralize this acidity, as well as to improve the size, or facilitate its application to the paper, some paper-makers add white soap to their gelatine. The writer fails to see what good this does, further than neutralizing the acid alum, and indeed this neutralizing of the alum means more than is generally supposed, for the result of the admixture of the two substances involves the destruction of both.

The soda of the soap combines with the sulphuric acid of the sulphate of alumina, forming sulphate of soda, and precipitating the alumina. Of course, the oily or fatty matters which were combined with the soda to form soap are set free, and may have some beneficial, though undefined, effect. It becomes a question of some interest, then, how the gelatine is really preserved from putrefaction, when soap is added in sufficient quantity to precipitate the whole of the alumina. It is quite clear that in that case the alum as such no longer exists, and it may be taken as estab-

lished that neither the sulphate of potash originally associated with the sulphate of alumina in the alum, nor the sulphate of soda formed by the reaction, have any preservative influence. The question just comes to be—does the precipitated alumina or the liberated oils accomplish this object, or is there really no chemical preservative agent present at all? Of course, it is quite likely that the soap may not be added in proportion equivalent to the alum, and that some sulphate of alumina may be left to exercise a wholesome influence.

The size, on being required for use, is reduced with water and conveyed to the sizing tub, the intermediate arrangements being such as will insure the tub being kept uniformly full. On the tub, or trough, the length of which is co-equal with the width of the drying machine, there is a roller which takes the web of paper down through the size, so as to saturate it thoroughly. The surplus adhering size is removed from the paper by passing it between a pair of rollers, placed so that the excess will flow back into the tub.—*The Paper Mill.*

Neatness.—Be careful of your dress, manners and speech,—a civil, polite manner always finds an easier existence than an uncouth or slovenly manner.—*Arno Kerster.*

World's Fair Notes.—In the California building will be shown a growing specimen of every California domestic flower obtainable, and also paintings, in water and oil, of 600 wild flowers and grasses.

The American Bible Society will make an exhibit in which will appear copies of Bibles in more than 200 different languages.

A New Use for Photography.—The U. S. Government in their efforts to suppress the so-called land boomers in Oklahoma resorted to a novel expedient. They furnished twenty-five United States Marshals with kodaks. Their orders were to press the button on every person found inside the lines. The result is that hundreds of boomers will be confronted with their photographs when they appear at the land office. This mode of identification may result in sending men to the penitentiary for perjury.

PRIVATELY ILLUSTRATED BOOKS.

TO many book collectors, and to the large and multifarious groups of readers who gather small and miscellaneous lots of books into so-called libraries, it will doubtless prove a surprise and a revelation to learn that, among the various forms of devotion to books, there exists that of the private illustrator—that there is a class of the bibliomaniacs who buy books for the express purpose of "inlaying" them with pictures, hunting out every possible pictorial hint or possibility that they contain, and enriching them with prints and etchings of great beauty and rarity. This mysterious and fascinating field of book worship has received lately at the hands of Mr. Daniel M. Treadwell very painstaking and elaborate study. Mr. Treadwell, himself a devotee and proficient in this elegant pastime, has prepared and published a monograph on this subject, wherein he recounts the marvelous exploits of rich and cultivated collectors, and offers a meed of unaffected praise to those who, less rich but equally enthsuiastic, have created masterpieces of the illustrator's art.

The aim involved in this accomplishment is to insert in some work, lending itself naturally to illustration, appropriate prints "which do not belong to the book, but which are pertinent to the subject treated." For instance, Mr. Treadwell's first venture was in Giraud's "Birds of Long Island," a book of some standing, and which naturally suggested a wide range of picturesque illustration. Mr. Treadwell does not, however, recall this early experiment with any sense of satisfaction, as it led him, in his search for material, to destroy a handsome quarto volume of the "Natural History of New York." One of his later and greater efforts was the illustration of Dr. Stiles's "History of the City of Brooklyn." In this interesting and suggestive effort he has added to the original work about two thousand three hundred pages, embracing portraits and prints of old historical landmarks, together with maps, manuscript additions, water colors, and letters. Of course, any amount of research and costly and lavish enrichment may be expended upon a book. The work itself may be

very suggestive, and if the illustrator is fastidious, he will hunt out the most striking, beautiful, and rare forms of illustration. For instance, Mr. Daly, the distinguished dramatic author and manager, has illustrated Macklin's Bible with thousands of illustrations, many of them originals, extending the book to thirty volumes folio. Nothing could be more superb. The work when finished is often inclosed in the most sumptuous bindings, which, with the cost of simply "inlaying" the illustrations, forms itself a respectable outlay. Take again the "Biographies of the Signers of the Declaration of Independence," by John Sanderson. This book, illustrated by Dr. Thomas A. Emmet, was extended to twenty thick volumes folio. It contains over three thousand autographs, eighteen hundred portraits, hundreds of prints and drawings, and fourteen water colors of American scenery by English artists who accompanied the British troops to America. These last were purchased at the sale of the Marquis of Hastings at $50 each. Here are signatures and letters of the signers, rare manuscripts and innumerable embellishments on India paper. This wonderful compilation is said to have cost twenty thousand dollars. The library of illustrated books owned by Mr. Hamilton Cole, of St. Mark's Place, New York, is another example of delicate taste and cultivated judgment. He has Izaak Walton, of 1836, enlarged to seven volumes, by the addition of two thousand prints, water colors, drawings, and many etchings. He has the "Memoirs of the Count de Saint Simon" in twenty volumes, royal octavo, "in faultless condition, with seven hundred portraits, nearly all proofs, including the one hundred and eighty portraits, proofs before letters, intended for the book, bound by Chambolle Dunn, in polished levant, with inside borders and watered silk linings." But perhaps the most gigantic and amazing example of this generous and refined industry is Mr. Stauffer's illustration of Westcott's "History of Philadelphia." Mr. Stauffer has added 8,000 illustrations, and expanded a book of some 2,500 pages to fifty volumes. Mr. Treadwell's estimate of the outlay and present worth of this extraordinary effort is $80,000, an estimate which, we believe, the distinguished illustrator considers altogether too high. Mr. J. H. V. Arnold, of this city, has extended Ireland's

"Records of the New York Stage" to twenty volumes folio, by the unrivaled addition of five thousand five hundred illustrations, and has expended over $9,000 upon his yet unfinished labors. It would be impossible in a short space to review the exquisite results of this form of bibliolatry, and the large work of Mr. Treadwell's is itself a fitting tribute to the zeal and enterprise of American illustrators. Few of our general readers and collectors are aware of the glorious and luxurious gems of the illustrator's art to be found in the private libraries of this metropolis, and Mr. Treadwell's monograph will perhaps stimulate and widen this pleasant form of literary diversion.

One word as to "inlaying," itself a delicate and skilled phase in the illustrator's craft, may be added. The master artists in this art, according to Mr. Treadwell, are Messrs. Trent, Toedteberg, and Lawrence, of Brooklyn. The process of "inlaying" is as follows: First comes the selection of paper of the proper quality and the size to which the book is to be extended. This done, the text of the book is all inlaid, page after page being inserted in the openings made in the paper sheets chosen. Then follow the prints. As these are of various sizes and shapes, they are cut down neatly, removing all extraneous margin, and have their outer edges beveled, the bevel extending about one-quarter of aninch upon the margin of the print. An opening is then cut into the sheet, of the size and shape of the print, making an allowance for a quarter of an inch lap on the inside, which is also beveled to conform with the print. The edges of the print and of the opening into which it is to be received are fastened together with rice flour paste. The sheets are then placed under a gentle pressure until required to be bound together in their proper order in separate volumes. In many cases, where print occur on the back of a woodcut, etc., which must be removed, the paper holding the engraving, etc., and the printed matter on its back, is split, by pasting the sheet between two pieces of stuff, which, when separated, removes on one side the printed matter, on the other the woodcut.

The artistic resources of the illustrator are drawn upon in this art, his historical knowledge and his technical appreciation of the excellence of engravings, woodcuts, etchings, and photographs. —*L. P. G., in the Scientific American.*

WHAT PAPER IS MADE OF NOW-A-DAYS—WOOD PULP vs. RAGS.

THE controversy over the use of wood fibre instead of rags is still raging fiercely in the English paper trade journals, and the defenders of wood fibre are becoming more and more numerous. The latest champion of wood fibre to enter the arena is Mr. W. Friedlander, who writes to the *Paper Trade Review* as follows:

"A man who to-day wants to fight against the introduction of cellulose, such as sulphite and soda, into almost all classes of paper can, in my opinion, only be put on the same level with that Spanish grandee who fought against the windmills. I appeal to the judgment and experience of those paper makers who use the best and chemically pure cellulose, which does not contain any undissolved particles or incrustations, and they will confirm that the fibre of such cellulose is in every way as pure as that of rags. An ever-increasing number of paper makers are using sulphite pulps. They are most careful in the selection of the kind they employ in their mills, and want an always regular and even quality guaranteed. They have reduced the consumption of rags very considerably, and yet have maintained the high quality o their papers.

It is stated that not two cellulose makes are alike. This is pretty well correct, but can our friend make any different statement about rags? Are the linens of one merchant exactly the same as the linens of another? All the more reason, therefore, to be careful in one's statements, and simply say, don't use bad sulphites for good papers. We all judge by results, and the sale of those qualities of cellulose which can be relied upon in their regularity is such that the largest paper mills on the Continent and in America have made installations of enormous magnitude to use more and more sulphite, and to produce with this material the finest paper for home consumption and export. I will even go further; fine sulphite pulps are used for the manufacture of all kinds of writing papers, including the very finest letter-post

papers, and also for the manufacture of the best lithographic and copper printing papers, ledger and account books.

"The pure fibre of cellulose, cotton or linen, is almost identical, with only this difference, that the paper makers are obliged to take the fibre of rags as it is, whilst the fibre of cellulose can be prepared as required, strong or soft. If some paper makers in the course of last year have had bad experience in the use of sulphite they have simply not yet learned which quality to adopt for their paper, and nobody can expect, if he wants to produce fine, durable paper, that he can do so with any rubbish. If buyers will only look at price and not test quality they must blame themselves if they earn loss instead of profit. With the admixture of good cellulose, soda or sulphite, as good a paper can be made any day as with the admixture of rags.

"The question whether we shall return to the use of rags is very soon answered. A paper mill, with good water and cheap coals, and which only uses cellulose, can make very much larger profits than a mill which uses rags; competition by the latter is out of the question, as the sulphite mill has the enormous advantage of working with a material which is always ready for use, saving time and labor, and in comparison with the rag mill increasing without extra expense the out-turn, doing away with all the preliminary waste and work bestowed on rags, smaller capital invested, etc., and the same applies to those mills that use wood pulp as an admixture with other materials. Not only shall we not return to the use of rags, but the consumption of them will get smaller and smaller in proportion to that of cellulose. Those few mills which still swear by rags to-day will in time be obliged to use cellulose, and the longer they wait the greater will be their disadvantage later on, as others will in the meantime have gained those experiences which they will lack."—*Wood Pulp News.*

The Hiawatha Camera Club of Minneapolis gave an exhibition last month in the library building, to which their friends were invited. The feature of the evening was an essay on astronomical photography, by Professor Wilson, of Northfield, Minn., followed by an exhibition of pictures by members of the club.

CRESCO-FYLMA.*

MR. HILL pointed out the advantages and applications of the method, and gave the following practical particulars:—

The principle of the process is to enlarge the film of any negative or positive by stripping. The particulars of working are as follows. Having added one part of water to three parts of the solution, the plate is placed on an ebonite tray (ebonite, however, not being an absolute necessity), and the diluted solution poured upon it.

In a few minutes the film will leave the glass, but without any appreciable expansion. When quite detached, it is necessary to leave it in the solution for a minute or two.

It is then lifted, supported on the glass it has just left, and transferred to a dish of clean water in which has been placed the larger glass it is intended to support the large film.

In this clean water the film will rapidly and evenly expand, and in about twenty minutes, during which time it will require no attention whatever, will have attained the limits of its enlargement. It is then ready to lift out of the bath, and placed upon a level support to dry.

It is necessary at this stage to blow out any air bells that may have accumulated under the film.

This completes the process, excepting that when it is dry washing is required, as in the case of an ordinary negative.

Should the plate to be enlarged be of such a size as not to be easily lifted out of the water bath after enlargement, an easy process is that of drawing off the water by aid of a small syphon, and allowing the film to settle down on the glass or opal.

The lecturer then proceeded to enlarge several positives and negatives, first treating a pyro-ammonia negative, enlarging some from half-plate to whole.

After that hydroquinone negatives and transparencies were enlarged from half to whole plate size, the transparencies being transferred to paper, glass, or opal.

Some questions were asked, and a hearty vote of thanks for the very successful demonstration was accorded to Mr. Hill.—*The Journal of the Camera Club.*

* (Demonstration of this method of enlarging, given by Mr. Albert Hill, on March 28th, before the London Camera Club.)

THE PENNSYLVANIA CHAUTAUQUA.

AT a popular gathering held at Mt. Gretna Park, July 31st, 1891, it was moved, seconded and decided by vote of the assemblage, that a committee, including the chairman, should be appointed to consider the advisability and prospects of organizing and establishing a "Chautauqua" at Mt. Gretna. This committee, consisting of Rev. A. M. Viven, of Cornwall, chairman; Tallie Morgan, Scranton; J. K. Bomberger, Bismarck; William G. Borgner, Lebanon; Frank Boyer, S. W. Turner and Rev. S. C. Swallow, D. D., of Harrisburg; Miss Florence Webster, Christiana; and James Brosius, of Octoraro, reported the same day in favor of the proposed project, and strongly urged immediate action toward its realization. A provisional committee of five was appointed from the number present, who should select a committee on organization, of fifteen representative persons from various parts of the State. This provisional committee, consisting of L. L. Grumbine, chairman, Rev. S. C. Swallow, D. D., J. G. Zook, Tallie Morgan and R. B. Gordon, met at Harrisburg, on August 26th, 1891, and selected as the original committee on permanent organization the following fifteen persons, namely: Rev. T. S. Wilcox, Harrisburg; Rev. S. C. Swallow, D. D., Harrisburg; Rev. J. Max Hark, D. D., Lancaster; Rev. H. B. Dohner, Lancaster; Rev. Joel Swartz, D. D., Gettysburg; Rev. Theodore E. Schmauk, Lebanon; Lee L. Grumbine, Esq., Lebanon; Rev. G. D. Woodring, Reading; Rev. Rufus Miller, Reading; S. W. Murray, Milton; Rev. H. H. Weber, York; H. T. Ames, Esq., Williamsport; Tallie Morgan, Scranton; Lewis D. Vail, Esq., Philadelphia; W. S. Essig, Royersford.

Some of the persons declining to serve, the committee was, from time to time, modified by the withdrawal of their names and the addition of new ones.

The first meeting of the General Committee on Organization met at Mt. Gretna Park, on September 24th, 1891. The persons in atttendance were Rev. J. Max Hark, D. D., Rev. H. B. Dohner, Rev. J. D. Woodring, Rev. T. S. Wilcox, Rev. Joel Swartz, D. D., Rev. Theo. E. Schmauk, L. L. Grumbine, R. B. Gordon, Rev. W. H. Lewars, J. H. Redsecker, C. Shenk and A. D. Hoffer.

After organizing by the election of L. L. Grumbine, chairman, and R. B. Gordon, secretary, the general committee divided itself into two sub-committees to devise and report plans of organization and finance.

The report of these sub-committees, after undergoing the various modifications which subsequent discussions suggested, and a fuller consideration showed to be wise and necessary, resulted finally in the "Constitution of the Pennsylvania Chautauqua," which was adopted at the first meeting of the stockholders, held in Lebanon, on January 6th, 1892.

At different meetings of the general committee Revs. Robert E. Carter, of Lebanon; George B. Stewart, of Harrisburg; Charles L. Fry, of Lancaster; G. W. Enders, D. D., of York; George Sigler, of Harrisburg; J. M. Carvell, of Middletown, and Charles L. Cooder, of Pottstown, were nominated and elected members of that body.

By this time the project had aroused much interest and gained great strength throughout the eastern part of the State. Various public meetings were held, at which the object and scope of the movement were explained and outlined. The leading educational men of the State evinced their cordial sympathy with it, and lent their co-operation to its successful development and consummation. It reeceived the endorsement of His Excellency, Robert E. Pattison, Governor of Pennsylvania, and many others occupying high stations in public life. Particularly fortunate was it in enlisting the prompt and hearty interest of the teachers of the public schools, while the influence of the press, as a matter of course, was freely and promptly thrown in in its favor.

Local committees were engaged in the sale of stock, and on January 6th, 1892, the stockholders met in Lebanon for organization, at which time the labors of the general committee were ended and its existence ceased. Rev. W. H. Dauber was elected chairman, and George W. Hayes secretary of the meeting. The stockholders elected the following persons to constitute the first Board of Managers: Robert B. Gordon, Joseph L. Lemberger, L. L. Grumbine, Jacob H. Redsecker, Harry B. Cochran, Charles L. Fry, George B. Stewart, S. C. Swallow, M. L. Montgomery, J. G. Mohn, John B. McPherson, H. W. McKnight, E. O. Lyte, W. H. Ulrich and W. H. Lewars.

The same day the Board of Managers elected the following officers: Chancellor, J. Max Hark, D. D.; President, Rev. George B. Stewart; Vice-Presidents, Dr. E. O. Lyte, and Dr. E. J. James; Secretary, Rev. H. A. Gerdsen; Recording Secretary, R. B. Gordon; Treasurer, George D. Rise; Executive Committee, Rev. Thomas S. Wilcox, Rev. T. E. Schmauk, Rev. J. M. Carvell, D. D., Rev. W. H. Dunbar, W. H. Egle, M. D.

Christian Culture, of Lancaster, Pa., was made the official organ of the Association.

Millionths of a Second.—Among other experiments performed by Prof. C. F. Boys, F. R. S., at the London Institute, and recorded in the early volumes of the Royal Society's proceedings, was the measuring the flight of the bullet, which was done as follows:

"The bullet in its flight was made to cut two wires, one at the muzzle of the barrel and the other six feet distant. These were attached to electro-magnets in connection with the main apparatus, which, roughly speaking, consisted of a carriage running on wheels and worked by a powerful spring. The pistol went off, and immediately afterward Prof. Boys triumphantly displayed, by means of the familiar lantern and screen, a smoked glass on which the apparatus had recorded its work. The points at which the wire had been broken were marked by a breakage in the two straight lines traced by the electro-magnets, and the distance between these two breaks represented the time which the bullet had taken to travel the six feet. The question arose how that period was to be discovered. But besides the two magnets a tuning fork was also attached to the carriage, and this tuning fork, when agitated, vibrated 1,000 times a second. The vibrations were recorded by a zigzag line on the glass, and just eight of the zigzags represented this distance marked by the magnets. This showed that the bullet traveled the six feet in 8-1000ths of a second, or 750 feet in a second."

But even this fraction of time, small as it might seem, was very large compared with those to be dealt with in optical and electrical science?

"What must be done, for instance, to measure the millionth part of a second? The Professor did this by means of what was known as the revolving mirror, which was capable of being driven at the rate of 800 times a second. An electrical spark of the twenty-five millionth part of a second's duration had been measured by this means. But the sparks he was using were longer than that, and could be used for photographing. He had some photographs of a soap bubble taken by Lord Rayleigh, in which it could be seen precisely what the bubble was doing when it burst. This was not so extraordinary after all, for it only burst at about thirty miles an hour, or forty-five feet a second. But he had some more wonderful photographs of a bullet traveling at 2,000 feet a second."—*Jeweler's Review.*

Love Order.—Put every article after use at once in its proper place, so that you can find it when wanted without having to look for it.

YEARNING OF A MISFIT.

BY HERBERT L. BAKER.

NEXT time the writer is hatched he will come out an artist. That is, if he has anything to say about it.

Not a tonsorial artist; he has no overweening desire to chase a sharp edge up and down within tantalizing distance of the jugular. Not a whitewash artist; his youthful trifling with the backyard fence destroys all germs of that desire. Nor yet a song-and-dance artist; the public would not stand his wearing his voice too decollete, and early practice before his father's hitching strap is too significantly brought to mind at any mention of dancing.

Last time he came into the world a misfit, artistically speaking. The soulful yearnings of an artistic genius, the clumsy fingers of a wild man of Borneo, and the steady hand of a palsy victim,—do not seem to combine into excellence of execution.

Strange, isn't it?

Somehow he cannot take a piece of paper, scratch around over it a little with a borrowed pencil, and enrapture every beholder with the result. Neither can he fill a squirt-gun with soiled water, and blow a lovely landscape on the canvas. Nor take a red-hot poker with a pine board, and imitate the alleged beautiful pyrographs so enthusiastically described by the devotees of the latest fad, nor yet dip a brush in a pale black moisture and dash off studies in wash drawing.

As a boy, he knew a cow pretty well when he saw it, and has distressingly vivid recollections of old brindle's horns; but after drawing an especially vigorous and lifelike picture of her cowship on a slate, his admiring friends rather overdid matters when they turned the slate wrong side up and went into superfluous ecstasies over it as a drawing of a ship scudding under bare poles.

True, he took the regular course in drawing, which at that time began at drawing the baby-cart, followed by lessons on drawing water, drawing the long bow, and drawing his wages

(which he could do with commendable regularity), stopping just short of drawing a prize in the l—tt—r—s he trifled with. But these lessons do not seem to have fitted him for a drawer of drawings, a sketcher of sketchings, a designer of designings. His circles will insist on having several flat sides, with occasional erratic humps more original than beautiful. His straight lines show a wobbling need of a temperance pledge, or a divorce from the contaminating influence of the wicked rail fence.

These longings for ability to create beautiful forms arise from no Quixotic notion of adding to the sum of human pleasure. No such unselfishness. But he has observed that the men who can promptly and satisfactorily turn their pencils to any subject are scarce, and therefore high-priced. And he is alive to the substantial gratification of being high-priced himself. Not that there is a scarcity of artists, so-called by themselves. Plenty of them can take a fine-tooth pen and sling off the prettiest and most impossible birds and scrolls you ever saw "executed by Mr. Blink after one lesson at Blunk's Commercial College."

Plenty of them can spoil lots of good material beating nature at her own game, and paint landscapes in colors never dreamt of by that sadly inartistic old dame. Plenty of them can sketch out agreeable designs, for the trade journals and otherwise, very pretty to look at and free from any suspicion of utility. Plenty of them can "letter" in that careless rough-and-ready style, supposedly artistic, which does not require that the reader decipher more than half of it without taking a day off to study out the fearful and wonderful disguises which A B C can assume in such hands.

But the artist who has eyes and ideas of his own, or who can take the misty suspicion of the shadow of an idea from a customer's mind, and work out what he wants when he does not know himself, who can make his work useful, available, as well as beautiful, who can draw a handsome plain letter, and two alike in the same line; who, in short, can turn his pencil satisfactorily to any practical subject, and illustrate it in an appropriate and attractive manner, and who can sketch "taking" designs for all sorts of uses,—this man has a fortune in his fingers, if he will

work hard, keep up with the times, and attend strictly to business.

He will need to understand the limitations of the printer, what he can and cannot do; be familiar with all the different processes of engraving; know which process will produce the best results for each subject, and how to prepare the drawings for each process; understand combinations of colors, and know how to get the most shades out of the fewest paintings; make drawings for color plates which will unerringly register; and especially to make bold, attractive, easily-read lettering. Such a man is the connecting link between the merely beautiful and merely practical?

There now! That is what the writer yearns to be next time he cracks eternity's shell and again appears in the nest of time.

When he looks upon his efforts to be artistic, and finds them to vary between the merely ugly and the appalling horrible, is it any wonder he longs to hurry his karma into the hence, with the hope of "better luck next time"?

Ah! that "next time" his yearnings may be ever so soulful, his longings ever so deep, but, after all, it is better to be a misfit than not to be; and he will try to be content to let others chase the elusive phantom of beauty, while he devotes his energies to salting down the big round cart-wheels which alone make beauty profitable.—*American Art Printer.*

Blue Transparencies.—Beautiful blue transparencies may be produced, according to M. Rossel, in the following simple way: Commercial cyanotype paper is exposed beneath the negative until the image will be very intensely visible, when it is thoroughly washed and placed for fifteen minutes in a ten per cent. solution of bichromate of potash. After the print has again been well washed, it is allowed to dry, and then rendered transparent by placing it on a warm glass plate and treating it carefully with paraffine. The print is then framed between two glass plates. The above-mentioned cyanotype paper, giving white lines on a blue ground, may be prepared by placing plain photographic paper in a solution of 24 grammes of ammonio-citrate of iron and of 25 grammes of potassium ferricyanide in 150 c.c. of water, and then drying it in the dark.

The Editorial Dropshutter.

Early Daguerreotype Days.—The especial attention of our readers is called to the series of papers under above title, commencing with the present number. The papers will prove of additional interest as in some circles the daguerreotype of old is again being taken up to see whether there are any possibilities of the process which may have escaped the early investigators, or which are now made possible by our far greater knowledge of the action of light and chemicals. It is expected that the papers will be fully illustrated by reproductions of the earliest specimens of the art, the pictures having been placed at the disposal of the writer by their various owners and custodians. Another curious feature of the search for specimens, which has extended over months, is the fact that most all of the old daguerreotypes are still in a good condition, as our reproductions of the first studio pictures, made early in 1840, plainly show. At first it was thought that all daguerreotypes were merely ephemeral, but time has certainly proven the contrary. Then again some specimens show a stereoscopic effect far superior to our present efforts. Here is a question for our scientific clubs: Why should these early daguerreotype efforts, made with crude apparatus and such chemicals as could then be procured, be more permanent than the processes of the present day, with all our increased knowledge and facilities, chemical, optical, and mechanical?

"The Wet Collodion Process," III., by Ellerslie Wallace. A careful perusal of these papers will repay any young professional photographer whose sole knowledge of the art consists of experience with the commercial dry-plate process. The information here imparted is practical, while the formulas have all been proved in actual practice. No learner or apprentice should neglect to read, study, and preserve this series of instructive papers. To all such we would say, preserve your JOURNALS and have them bound at the end of the year.

What Paper is Made of.—Last month we published a leader upon the permanency of photographic productions, mechanical as well as heliographic, showing that the trouble without doubt was with the paper used. This month we follow with a paper from the *Wood Pulp News*, a paper published in the interests of the paper trade. A careful perusal must furnish plenty of food for reflection to the intelligent reader, be he a toiler with the pen or a manipulator of the camera.

Privately illustrated books, a paper which originally appeared in the *Scientific American,* and appeals directly to the amateur who at the same time is a lover of books and art. It is just here that the new photographic processes, such as bromides and platinums, together with silver prints on plain paper, come into play; a fact of which the reviewer as well as the writer of the treatise mentioned seems to be ignorant.

It often happens that an illustration cannot be duplicated, yet two or more copies are needed. Thus the photographic processes come into requisition and supply the deficiency. We have seen many such examples, where photographic copies were used, and where proper care was taken to have the whites clear the results were always satisfactory.

We have in Philadelphia and in some interior towns of Pennsylvania illustrators and inlayers second to none in the country, who pride themselves that the inlaying is so well done that it cannot be detected except by an expert, prominent among whom are Ferdinand J. Dreer, Esq., of Philadelphia, and the Rev. Dr. Dubbs, of Franklin and Marshall College, of Lancaster.

Nor should it be overlooked that the Mr. Stauffer quoted in the main paper is a native of Lancaster County in Pennsylvania, and that he started his now priceless collection while living at his home in Pennsylvania's inland metropolis.

There are several persons in Philadelphia who "inlay" professionally, and whose work is second to none. A few illustrators, however, still send their inserts to Europe to be mounted, where the supplying of photographic copies for the purpose has assumed quite large proportions, a fact which should not be overlooked here.

Photographic Work.—A new candidate for public favor has appeared under above title. The new periodical is a weekly, and is published by Piper & Carter, 5 Furnival Street, London, E. C. The subtitle sets forth that it is to be "a concise and complete record of all phases of photographic activity." We welcome this new star in the firmanent of the photographic constellation, and predict an extensive orbit for the new luminary.

Photographic Work is published by the former publishers of the *Photographic News,* and in make-up and style, editorially and mechanical, is the counterpart of the *News* of old. The new venture has the full advantage of over a quarter of a century of experience, and will be welcomed by all the old patrons of the *News.*

OUR ILLUSTRATIONS.

Our Frontispiece.—A specimen of aristotype work on the *Omega* sensitized paper; negatives are from the celebrated Sarony Gallery in New York. The omega is a chloro-bromide emulsion paper, and has by merit alone established a firm footing for itself with both professionals and amateurs. The prints were made by the C. E. Hopkins Company.

A Panoramic view of the harbor of Philadelphia, with the islands now being removed by the United States Government. A reduced reproduction in half-tone of a panoramic negative.

This view was taken by Mr. Fredk. Gutekunst, of 712 Arch Street, Philadelphia, with a Moessard Cylindrographe Photographique, fitted with a new French lens, made expressly for panoramic exposures, upon a curved film 36 inches long. The camera is fitted with a peculiar automatic attachment which obviates the necessity of uncapping and capping the lens, as it opens and shuts the lens the moment the exposure is started and concluded: this insures extreme sharpness over a field of 180°. It will be further noticed that the view is entirely free from the curvature of the lines, so common to views of this kind. Silver prints as well as phototypes of full size have been made of this negative.

Our illustration, engraved expressly for the AMERICAN JOURNAL OF PHOTOGRAPHY, is from a half-tone-block, made in the Gutekunst establishment, a department of photo-engraving having lately been added to the already extensive reproduction plant. The technique in every department does credit to the establishment, and compares favorably with any of the older houses.

Do not forget to study and practice the old wet collodion process.

Photography has made the work of the lecturer far more interesting to his audiences than used to be the case.

Paper Stock.—The difference,—while clean white No. 1 rags are quoted at $5.50 per cwt., wood pulp is rated at $1.25.

Photographic Hints and Formulæ.

According to the *Photographische Correspondenz*, the following mixture forms an excellent medium for writing upon glass:

I.—Fluoride of sodium	36 grams.
Potassic sulphate	7 grams.
Water	500 ccm.
II.—Chloride of tin	14 grams.
Dissolved in water	500 ccm.
Then add muriatic acid	63 ccm.

For use, equal parts of I. and II. It is applied with a quill pen same as ordinary writing ink. After a lapse of half an hour the writing will be etched matt upon the glass.

Process for Stiffening Films:

Carbonate of soda	2 grams.
Borax	5 grams.
Water	1600 ccm.

When dissolved add:

Pulverized shellac	32 grams.

This mixture is then boiled over a low fire until the shellac is completely dissolved, then add:

Glycerine	2 grams.
Water to bring volume to	3200 ccm.

After a few days the solution is to be filtered, as a sediment is apt to form.

Films, after being thoroughly fixed and washed, are dipped while still wet in this mixture, until they are thoroughly saturated. The films are then tacked up to dry in the usual manner. If properly done they need no varnishing, and will stand as much handling as glass.—*Wochenblatt.*

Combined Day and Flash Light.—Eugene Hakh, of Stuttgart, lately read a paper upon his method of life-size heads, in which he gave a description of his peculiar process, which consists in supplementing the day light with artificial illumination, which is said to combine rapidity with softness of the negative. The lecturer stated that he uses a special camera and objective, the latter made expressly for him

by Dr. Steinheil, and requires diaphgrams with square openings both in front and behind the lens.

To obtain the maximum of illumination large reflectors are employed to concentrate the sunlight, in addition to large cartridges of Blitzpulver which give an immense light with extra rapid combustion.

Dr. Steinheil states that in an ordinary studio the special lens would require an exposure of at least eight minutes to produce a full-timed plate.—*Photographische Correspondenz.*

Varnish for Coated Paper.—Beyersdorff gives following formula as best for coated papers such as our half-tones are printed on, and is used on the continent for collotypes:

Borax	100 grams.
Water	300 grams.
Pulverized white shellac	200 grams.
Alcohal	100 grams.

Dissolve borax in water, and bring it to a boil; then add shellac with constant stirring until thoroughly dissolved, then remove from fire and continue stirring until half cold; then add the alcohol under constant stirring. If the varnish is too stiff, dilute with equal parts water and alcohol.—*Dr. Eder's Yearbook 1892.*

Auro-Platino Toning Bath.—Dampen the silver prints, then place in gold bath:

Water	2880 parts.
Borax	45 parts.
Chloride of gold	1 part.

Let them remain until they have turned to a warm brown tone, then wash in clear water one minute, after which place in platinum bath:

Water	2880 parts.
Citric acid	30 parts.
Chloroplatinite of potassium	12 parts.
Common salt	48 parts.

Until they turn to a purple black tone.—*E. Valenta, Dr. Eder's Yearbook, 1892.*

To Photograph on Silk.—Immerse the silk in

Water	1 ounce.
Gelatine	5 grains.
Chloride of sodium	5 grains.

Hang it up to dry, then float it for half a minute on a fifty-grain solution of nitrate of silver; dry, print, tone, and fix as usual.—M. A. R.

Water-Color Medium.—This serviceable medium so indispensable to the retoucher and photo-colorist is prepared as follows: Procure from a butcher half a pint of ox gall. Place this in a clean saucepan, and add an ounce of powdered alum and an ounce of common salt; place over the fire, and when it boils remove for half an hour to cool; then boil up again, and repeat this boiling and cooling three or four times. After this allow it to settle for four hours, and decant off into a bottle, in which put two or three drops of essence of lemon.—M. A. R.

The following is a method of obtaining an intense negative by means of one much too weak to print from: Place the negative in the copying camera, in the conjugate of which a transparent positive is obtained, which can be intensified by means of bichloride of mercury, followed by a cyanide and silver solution, to any degree of density.

The transparent positive in turn is placed in the copying camera, from which in the same manner a negative can be obtained of any amount of density required.—R.

COLOR PHOTOGRAPHY.

WHILE some of the American newspapers are discussing, as something new, the admittedly imperfect experiments of foreigners, it is interesting to note what the *Pall Mall Gazette* says of the work of a Philadelphia inventor:

"An entirely novel means of gaining by photographic processes an approach to the natural color appearances of scenes and objects is shortly to be brought to the notice of the British public. The invention, which is called "Heliochromy," is the discovery of Mr. Frederick E. Ives, of Philadelphia. It has received considerable attention in the United States, and it will no doubt be a matter of discussion in metropolitan scientific circles for some time to come. Mr. Ives is to give a demonstration at the conversazione of the Royal Society this evening, and he is engaged to lecture at the Royal Institution on the afternoons of the 10th and 17th of the present month. He is going after that to Scotland with Mr. Cameron Swan (who takes great interest in the discovery) to photograph landscapes for purposes of color demonstration, and he will by and by proceed to Switzerland for a like purpose. A representative of the *Pall Mall Gazette*, who was afforded an early opportunity of inspecting the results obtained, sends the following account:

"To clear the ground a few matters may be premised. The invention in the sense of pure science does not claim to be color photography. In the strict meaning, a color photograph would be a picture taken directly by lens and camera with the colors and the light of nature. Such a thing has never been done, and there is nothing in the present state of science to justify the supposition that this result may ever be accomplished. It certainly has been possible to obtain upon a film of quicksilver some impression more or less fleeting of a few of the colors of the spectrum. It would, morever, be practicable, with prolonged exposure, to obtain some kind of colored image from a powerfully illuminated object of, say, a red color. But the impression would be a mere silhouette of color without light and shade of gradation. Such successful experiments have frequently been made and chronicled from time to time in the newspaper press as the early promises of a great discovery. The last occasion may be fresh in the memory of many. This was the result of some researches by Professor Lippman, of Paris. But his discovery admittedly fails to render even the simplest combinations of color. It would appear that no clue exists to the secret of color photography. The dream may fascinate, and the hope may stimulate, but the search has hitherto been as fruitless as for the philosopher's stone. This much for the scientific. To the more practical we may state that there is little chance of having one's portrait done in the colors of life. It requires two minutes' exposure in Mr. Ives's camera to take a view in open sunlight, so that none could sit still during the more extended exposures necessary in portraiture. Neither has the discoverer yet arrived at entirely satisfactory results on paper or on solid substance. He has made good transparencies on glass, but his greatest successes are projected from a kind of magic lantern, and in a small instrument of the 'stereoscope' kind, which he calls the 'heliochromoscope.

"If Mr. Ives has not discovered the secret of color photography he has made a nearer approach to the colors of nature than anything previously accomplished. The principle, based on the composite character of light, may best be grasped by describing the procedure. A photographic camera is fitted with an ingenious arrangement of mirrors, which throw three images, in trefoil arrangement, from the single lens upon a sensitive photographic plate. Each of these images is 'filtered' through a color screen before reaching the plate. These screens correspond with the three primary colors, or, as Mr. Ives prefers to call them, the three fundamental color sensations. By this means one of the images receives the red-colored rays of light, one the

blue and one the green. The result is three transparent, colorless photographs of the object, differing each from the other in what we may here call light and shade. The transparency so obtained is placed in a triple magic lantern, the tubes of which are fitted with colored glasses. These glasses of primary colors have required much study, as affecting in their precise view the truthfulness of the result, and it says much for their accuracy that they combine together on the screen as white or colorless light. The lantern tubes are so arranged that when the three images are projected by limelight on a screen they are exactly superimposed. The result then is this, that the combined images fall upon the screen in the colors of nature, or in a very tolerable approach to them. Mr. Ives has several photographs of flowers, such as geraniums, and views in the Yellowstone National Park, which he projected for the information of our representative, who can testify to their undoubted brilliance. They will be shown at the Royal Society this evening.

"The apparatus which Mr. Ives has invented will thus be seen to be a kind of magic lantern suitable for lectures and demonstrations. He has also made his 'heliochromoscope,' a little box like a stereoscope, which shows flowers and views in natural colors. It will be manufactured shortly, and should command success as a delightful drawing-room toy. The whole invention will, doubtless, give in a few years a great impetus in a new direction to amateur photography. For, if it is interesting to take views in monochrome, how much more so will it be when the amateur can see his pictures in color!

"The matter of colored prints is much more difficult than that of transparencies, because the purest of pigments combine indifferently as compared with light. But Mr. Ives hopes to have good results at no far distant date."

Maxims for Amateurs.—Never bite off more than you can chew.

Never interfere with anyone whose livelihood depends upon photography.

Remember it is the negative, not the toning bath, that is the important factor in the tone of the print.

The best way to doctor a negative is to make a new one.

Don't attempt to make your own dry plates.

The latest substitute for glass is a kind of dry, flexible collodion. It resists the action of salts, alkalies and dilute acid, and is inodorous and transparent. Its chief use is likely to be in photography.

THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.

A STATED meeting of the Society was held Wednesday evening, May 1st, the President, Mr. Joseph H. Burroughs, in the chair.

The Board of Directors reported the election of several active members.

After the reading of the Minutes and the conclusion of the regular routine business, Julius F. Sachse, Esq., read a paper upon "The Chronological Portraiture of General George Washington." In connection with this subject the lecturer exhibited a series of thirty-six portraits of the illustrious subject in platinum, black and sepia, arranged in chronological order, and including every known authentic portrait from life, from Peale's first study at Mt. Vernon in 1772 to that of St. Memin in Philadelphia in 1798, the last ever made from life.

Included in the collection were photographic copies of the mask taken of Washington's face by the celebrated artist, Hondon. Hondon came to this country for the purpose of modeling a statue of Washington, which was to be placed in the Capitol of Virginia, pursuant to a resolution of the General Assembly in June, 1784.

He spent two weeks at Mount Vernon in making sketches and careful measurements of Washington's person, and on October 13th of that year he made, in plaster, a mask of the face, from which a cast was made and the well-hnown bust modelled.

The original life mask remained at Mount Vernon, and upon the occasion of the removal of the General's body to the present sarcophagus in 1832, it was loaded to Struthers, the Philadelphia marble mason, who made a plaster cast from the mask.

This was presented to the Historical Society of Pennsylvania, and from the cast Mr. Sachse made the three photographic studies which give a clearer conception of the true lineaments of the illustrious original than any other portrait in existance.

The portraits were arranged against the wall in such a manner that the changes wrought by the cares of state and increasing age could be clearly traced, the whole offering an opportunity for a comparative study of Washington portraiture never before presented.

Upon the conclusion of the address it was resolved, upon motion of Mr. Hudson S. Chapman, that a vote of thanks be extended to Mr. J. F. Sachse for his interesting and valuable paper read before the Society this evening.

Mr. A. E. Maris exhibited a Hetherington magazine hand camera, and explained the mechanism and practical manipulation.

Mr. John Carbutt followed with a "Genie" hand camera. A number of specimen prints made by this camera were also shown.

A collection of lantern slides, made by members of the Waterbury Photographic Society, were to have been shown, as announced, at this meeting, but as they failed to materialize, a number of excellent Mexican view by Mr. Wm. H. Rau were substituted.

Adjourned.

Be courteous.—There's money in it. It costs nothing and pays well. One can be "rushed," be independent if he wishes, and yet be courteous. According to the *Canadian Druggist*, in these days of keen competition every little counts, and the storekeeper who is anxious to keep up and increase the number of his customers must never forget to treat them with the utmost courtesy. Some people, otherwise pleasant, put on a very disagreeable nature when they go shopping, making the life of the person who serves them as miserable as possible. But this must be borne with, and politeness served out with the goods just as readily as paper is given without charge for each parcel. "Oh, how disagreeable they are at Mr. So and so's." "Yes, their goods are cheap, but I'd sooner pay Mr. Some-one-else more and be treated civilly!" Expressions like these are very frequently heard, especially in the largest centres, where there is considerable unknown or "catch" trade.

Speaking of one of the largest stores in Toronto the other day to a lady, she told us that having once been treated rudely there she would never enter the door again. Of course the fault lay with a single clerk, and we cannot commend her in her sweeping judgment of the whole establishment, but unreasonable as it may seem, the majority of ladies (and ladies do most of the shopping) will be influenced in this way. Keep the right goods, of the best quality, charge enough for them, wrap them up neatly, sell them for cash, and never lose an opportunity of being polite to a customer, and your trade will constantly become larger and more profitable.

WANTED.—A skillful dentist to fill the teeth of a gale.

WANTED.—A cook to prepare dinner on a mountain range.

WANTED.—A stand-up collar for the neck of the woods.

WANTED.—A hat to fit the head of the Missouri River.

WANTED.—A set of artificial teeth for the mouth of the Mississippi.

In the Twilight Hour.

NEVER complain of being ill used.

UNQUIET meals make ill digestions.

DON'T be afraid of a little fun at home.

BE slow to contract a new and doubtful alliance.

THE best capital to begin life on is a capital wife.

THINK twice before you break off an old and tried friendship.

TRY to let everybody's faults be forgotten, as you would wish yours to be.

A MAN'S good breeding is the best security against another's bad manners.

UNBECOMING forwardness oftener proceeds from ignorance than impudence.

THE three things most difficult are,—to keep a secret, to forget an injury, and to make good use of leisure.

NEVER speak boastingly of your business: keep your own counsel about the management of your affairs.

FIND recreation in looking after your business, and your business will not be neglected in looking after recreation.

GRIEF knits two hearts in closer bonds than happiness ever can; and common sufferings are far stronger links than common joys.

REFLECT on what you see and hear. Set your mind at work; reason with candor; weigh well and consider for yourself, decide and act.

CONSIDER the causes of the good standing of some, and the decline and fall and want of success of others, and regulate your conduct accordingly.

BE cautious with whom you associate, and never give your company or your confidence to persons of whose good principles you are not certain.

THE more a man follows nature and is obedient to her laws, the longer he will live; the farther he deviates from these, the shorter will be his existence.

BEWARE of desperate steps; the darkest day,
Live till to-morrow, will have passed away.
—*Cowper.*

MANY a man lives a burden to the earth; but a good book is the precious life-blood of a Master-spirit, embalmed and treasured up on purpose to a life beyond life.—*Milton.*

AN ingenious French writer observes that those who depend upon the merits of their ancestors may be said to search in the root of the tree for those fruits which the branches ought to produce.

BY relying on our own resources we acquire mental strength; but when we lean on others for support, we are like an invalid who, having accustomed himself to a crutch, finds it different to walk without one.

THE greatest efforts of intellect have almost always been made while the passions are in their greatest vigor, and before hope loses its hold on the heart and is the elastic spring which animates all our thoughts.—*Hazlitt.*

CHEERFULNESS. — A cheerful temper joined with innocence will make beauty attractive, knowledge delightful, and wit good natured. It will lighten sickness, poverty and affliction, and render deformity itself agreeable.

Literary and Business Notes.

OUR enterprising occidental contemporary, the *Californian*, in the May number publishes an interesting illustrated paper on "Opium and its Votaries," showing the effect of this Chinese vice upon the miserable wretches who have become addicted to the drug. The paper is fully illustrated, and shows the terrible squalor of these haunts of iniquity which have lately been introduced into all large cities to a greater or less degree. The *Californian* states:

For ten years photographers, amateurs and professional, have been trying to obtain photographs of the underground opium dens of San Francisco, but without success. The intruders were driven out, their lives threatened, cameras ruined, and it was generally understood that a man took his life in his hands in making such an attempt. The *Californian Magazine* proposed to illustrate the following paper in a manner never before attempted,—in fact, by photographs taken by flashlight in these dens, and on a certain night, a few weeks ago, accomplished its purpose by force of numbers, intimidation and diplomacy; the results are here with submitted, being the first interiors of these dens ever shown or likely to be.

Realizing the danger, and the possibility of getting a stray bullet in the rush that was sure to come, the Californian party was made up with a view to taking the pictures, come what might.

The party was led by one of the most skilled and determined detectives in San Francisco, Chris Cox. Others were Mr. H. J. Brener, then of the Art Department of the *Californian*, Frank Davey, the expert photographer of W. Taber's, and his assistant, Mr. Amsden, with another representative of the magazine. The camera was a large eight by ten instrument, while a flash box and a plentiful supply of *Blitzpulver* completed the outfit. In many cases the smokers rushed out or hid themselves before the shot could be taken, and in the dark dens, many feet below ground, amid yells, oaths, threats and shrieks, often left in complete darkness, the party accomplished its work, one of the pluckiest performances in the cause of "reform" ever made.

THE PRINCIPLES OF A PHOTOGRAPHIC LENS. R. and J. Beck, 48 Cornhill, London, E. C.

A pamphlet of twenty pages, intended as a guide to the use of a photographic lens by the amateur photographer. The work treats upon the principles of a photographic lens, the lens proper, the selection of a lens, together with the use of stops and the swing back. A readable and instructive pamphlet.

JAHRBUCH FÜR PHOTOGRAPHIE UND REPRODUCTIONSTECHNIK FOR 1892, by Dr. Josef Maria Eder. Published by Wilhelm Knapp, Halle a. S. Illustrated by 106 wood cuts in addition to 33 full-page reproductions representing every school of photo-reproduction.

This annual stands head and shoulders above all its European competitors. The matter contains 283 pages of original contributions for the work, divided into 89 different papers representing 68 different writers.

The second part recites the progress made in photography and the reproduction-technic during the years 1890–1891. Among the illustrations are two studies from negatives by Mr. J. F. Sachse, editor of the AMERICAN JOURNAL OF PHOTOGRAPHY, showing the growth of plant life within seconds of time.

We commend the Jahrbuch to every photographer, professional or dilettante, who is familiar with the German language, and such as are not will find occasional extracts in this Journal. It is one of the most valuable additions to our photographic library for the year.

ANNOUNCEMENT.—Notice is given of the consolidation of the Eastman Company with the New Process Film Company under the name of the Eastman Kodak Company. All contracts and liabilities of the old company have been assumed by the new company.

WE are in receipt of No. 5 of "The Library of American Authors," — *The Heiress of Cameron Hall*,—with compliments of Vernon Bros. & Co., New York. The book is printed on bood paper free from all ground or sulphite wood pulp.

RECENT PATENTS.

THE following list of patents relating to the photographic interests is specially reported by Franklin H. Hough, solicitor of American and foreign patents, No. 925 F. Street, Washington, D. C.

ISSUE OF APRIL 5TH, 1892.

472,257—Photographic Camera; B. J. Edwards, assignor to Eastman Company, Rochester, N. Y.

472,021—Pictures, stretcher for the paper or canvas of; J. N. Anderson, Chicago, Ill.

ISSUE OF APRIL 12TH, 1892.

472,702—Photographic Plate-Changing Apparatus; F. A. Fichtner, Dresden, Germany.

472,883—Photographic Shutter; F. R. Hoyt, Watkins, N. Y.

ISSUE OF APRIL 19TH, 1892.

473,375—Photographic Apparatus, Coin-Operated; W. H. C. Bernitt, Hamburg, Germany.

473,358—Photographic Camera; F. Servus, Berlin, Germany.

473,188—Photographic Shutter; C. F. Green, Kalamazoo, Mich.

473,358—Photographic Shutter; F. Servius, Berlin, Germany.

ISSUE OF APRIL 26TH, 1892.

473,814—Photographic Dark Rooms, Candle Lamp for use in; H. A. Benham, W. H. Thomson, London, England.

473,767—Photography, Improving Oil Paintings by; L. Meyer, Berlin, Germany.

473,763—Photography, Making Relief Plates by; J. Husnik, Prague, Austria-Hungary.

ISSUE OF MAY 17TH, 1892.

474,570—Photographs of Hard Surfaces, Producing; A. Muller-Jacobs, assignor to Heliocaustic Art Co., N. Y. City.

474,833—Photographic Kit; J. H. Iden, Bourbon, Ill.

ISSUE OF MAY 24TH, 1892.

475,372—Photographic Pictures, Developing; M. Andresen, Berlin, Germany.

475,654—Photographic Shutter; J. R. Albrecht and E. Ortman, New York, N. Y.

THE CHRONOLOGICAL PORTRAITURE OF
WASHINGTON,
1772 - - - 1798,
PHOTOGRAPHIC STUDY FROM HOUDON'S LIFE MASK BY JULIUS F. SACHSE.

AMERICAN JOURNAL
OF
PHOTOGRAPHY

THOS. H McCOLLIN, Managing Editor
JULIUS F SACHSE, Editor. XANTHUS SMITH, Associate Editor

Vol. XIII. JULY, 1892. No. 151

THE INACCURACY OF DESCRIPTION OF PHOTOGRAPHIC OBJECTIVES BY MANUFACTURERS AND EDITORS.

BY PROF. W. K. BURTON.

Imperial University, Tokyo, Japan

BARRING the last two words, the above is the title of a paper by Mr W. A. Cheyney that particularly attracted my notice in your issue for April. The paper is to the point, and is on a subject that ought to be thoroughly ventilated.

Put briefly the matter is this: a number of opticians make lenses especially for photographic use. Many of these lenses are, considering the conflicting requirements of a photographic lens, so good that they are a standing wonder. The opticians charge a pretty stiff price for them but of that we—the buying public—do not complain. We ask, however, if it is not unreasonable to demand that the descriptions of these lenses, in catalogues and advertisements, be at least fairly accurate, that they be not disfigured by a lack of intelligence that would bring ridicule on the advertisement of a tailor or shoemaker.

It is probable that the catalogues and advertisements of most manufacturers of photographic lenses are a relic of the time when the greater number of photographers were ignorant of the most rudimentary facts not only of optics, but even of the properties of the lenses they used: when anything about the ratio of aperture to focal length was a mystery profound, when it was commonly supposed that there was some fetish in a "portrait lens," apart from the angular aperture, making it particularly suitable for

portraiture: when, particularly, there were wonderful delusions about depth of focus, when, in fact, it would have been useless to afford the information now so generally demanded.

There are exceptions to every rule, and there are some (English, at any rate) opticians who issue catalogues giving all the information wanted. I think of one in particular who sends out a large sheet giving the equivalent focus and the maximum working apertures of all the different sizes of the different classes of lenses that he makes. I know, too, that with this optician the actual equivalent focus is always very nearly that stated in the sheet, that the apertures are actually those stated; and I believe that if a lens of precisely the focus mentioned is wanted, the fact has only to be stated.

How different it is with many opticians was forcibly brought to my attention a little time ago. My advice was asked about buying lenses for a particular kind of work. I soon decided on the class of lens wanted, but it was necessary to determine from whom the lenses should be ordered, and hence a great rummaging through catalogues. It was quite essential to know the equivalent focus and also the maximum working aperture before ordering the lenses. Now, in the catalogues of three English opticians of high repute, there were found the following anomalies. One gave, throughout, the equivalent focus of the lenses, but nowhere stated the working aperture. Another gave the equivalent focus of the lenses and their diameters, accompanied by diagrams showing that the working aperture was in most cases much less than the diameters of the actual combinations. In the catalogue of still a third optician, there were given, for some lenses, both the equivalent and the back focus (almost a work of supererogation), for others the equivalent focus only (just what was wanted), for still others merely the focus. In this last case, it was only actual experience of the lenses that enabled me to know that it was the back focus that was stated. It is some slight consolation to think that these opticians lost all chance of at least one order, simply from the idiotic way in which their catalogues were put together.

There are other offences committed by manufacturers of lenses. Why, for example, should the intelligence of the photographic

public be insulted by advertisements of wide-angle lenses headed "these lenses include an angle of more than 100°," whilst below there is a table of the sizes of plates that the lenses will cover with "large, medium, and small stop," which table shows that the lenses will not include an angle approaching 100° even with the small stop, and taking the diagonal of the plate into consideration?

As for lenses not having the apertures advertised, I think that perhaps English opticians are a little more conscientious in this matter than Americans, although I can be by no means sure. Very often where "aperture" is mentioned, or is inferred by stating that the angular aperture is so and so, and giving the equivalent focus of the lens, it is found that the diameter is actually that of the glasses of the lens, and that the cell cuts it down very appreciably, or that a fixed stop contracts the working aperture. In judging of the latter matter, however, it should always be borne in mind that in the case of double combination lenses, the fixed aperture may be a little less in diameter than the front combination without cutting off any light, because this light is somewhat concentrated by the front lens before it reaches the stop.

There has been a great improvement amongst English opticians within the last few years, in the matter of the accuracy of cutting stops. It is not so long ago that they were cut at pure random. Even for some time after certain opticians professed to have adopted the Universal Standard, the stops were seldom even approximately in accordance with it.

Now for the editors and others who write in the periodical press about lenses. To the like of myself, living thousands of miles from the nearest place where photographic lenses are made, it is of the first importance that the descriptions of new lenses given in the photographic periodicals should be intelligible. Sometimes they are; but alas how often they are not! By the same mail that brought the issue of the AMERICAN JOURNAL OF PHOTOGRAPHY above mentioned, there was brought a copy of an American contemporary: a journal that I value much,—because it is edited by two people of talent, and the reading matter is generally excellent.

Under the head of "Editorial Comment," I came on a paragraph beginning, "An improved lens." This at once attracted my attention, the more particularly as after a few preliminary remarks on the "wonderful discoveries made in optics and chemistry," it was stated that the lens is made of the new Jena glass. Now I particularly want to know something definite about the results of the use of the new Jena glass for photographic lenses. The next statement, however, is, to say the least of it, confusing. It read that, "it is made . . . single, rapid, rectilinear, and wide-angle, and does, as the makers claim, work with full aperture, sharp to the edges of the plate." This remarkable statement wants a deal of consideration. Is there actually one lens that combines all the qualities here mentioned? That is, at the same time, "single, rapid, rectilinear, and wide-angle"? Although there is nothing in the "Comment" to clearly indicate it, I am forced to suppose that there are three different kinds of lenses, because for one thing I imagine it is impossible, even with the Jena glass, to make a lens having all the qualities indicated above. What on earth use it is to know that "it . . . does . . . work, with full aperture, sharp to the edges of the plate," without any statement of focal length, maximum aperture, or size of plate, is a thing that I leave to your readers.

A little lower we learn that "those of long focus are something like the new lens of Dallmeyer, which is making such a sensation abroad." One is inclined to interpolate "something like a whale."

But at this stage comes the most interesting part of the whole description. We learn that "The great value of the lens lies . . . in an attachment which can be put in place of the rear combination, and produces actinically modified rays of light, thus reducing harsh contrasts and obviating in portrait work the necessity of retouching. The results as described are remarkable, and give much the same effect as orthochromatic plates." Remarkable! I should think so with a vengeance! A lens obviating the necessity of retouching, and giving the same effect as orthochromatic plates!

Leaving on one side the extraordinary property of a "rear combination" that can "produce" rays of light . . . whether in

the vulgar sense of originating, or in the geometrical of extending in the same straight line . . . what in the world can this attachment be? At first it seemed to me that it might be a diffusion of focus arrangement, although it is difficult to see how that could give "the same effect as orthochromatic plates," and I hailed the information with pleasure, for a landscape lens with a diffusion of focus arrangement is still a desideratum. What comes farther on seems, however, to contradict this idea.

It presently transpires that "we have only tried the ordinary rapid rectilinear, but have ordered the violet light attachment." Angels and ministers of grace, defend us! What does this mean? I thought that all the lenses, if there were really three of them, were not ordinary, but extraordinary, particularly considering that "those of long focus are something like the new lens of Dallmeyer." Then if only "the ordinary rapid rectilinear" was tried, how about the implied evidence that it, this three-in-one lens, in in all its forms was found to work with full aperture to the edges of the plate "as its makers claim"? But the "violet light attachment" beats all!

For the nearest approach to definite information that we have in the "Comment" is that "Miss Barnes will probably use the lens in her European tour the coming summer!"

Surely we may demand with reason that the manufacturers of lenses shall describe their goods a little more intelligently than they do, and that commenting editors, unless they can tell us something more definite about lenses that they have tested than do these referred to, should hold their peace.

Over the editors we have no control. Over the opticians we have to a certain extent, and I suggest that all photographers should do what they can, by promptly returning lenses that are not in accordance with catalogue description, demanding either a return of their money or a lens that is in accordance with the description. Farther, that where other things are equal, they give their custom to those opticians who issue intelligible catalogues, and whose goods are found to be in accordance with their advertisements.

COMPOSITE HELIOCHROMY.

THE reception accorded in England to our townsman, Fred. E. Ives, of Philadelphia, is most gratifying. His demonstrations in the reproduction of the colors of nature by photographic means before the English Royal Institute on May 3d and 4th, called forth nothing but praise from both press and public. The lecture and demonstration were repeated by request on May 25th before the Society of Arts in London, upon which occasion the chairman, J. W. Swan, F.C.S., in introducing Mr. Ives, said:

"Mr. Ives needs no introduction to an English audience; his work in connection with the translation of the continuous gradation of an ordinary photograph into discontinuous gradation is known throughout the world. The excellent quality of the half-tone photographic engravings—so profusely employed in the illustrated literature in America—is largely due to Mr. Ives' initiative. But to-night we are to hear and see the results of his labors in a different direction,—that of photography in natural colors, an object of desire that arose in the minds of almost the earliest workers of photography. No sooner had that miracle of science—the production of a photograph in light and shade—been wrought, than the insatiable striving after something higher and better—the best attribute of the human mind—asserted itself in the desire for color in addition to light and shade; and very soon this desire received the stimulus of what appeared to be, if not a complete, at any rate, an approximate solution of this problem. In the exhibition of 1851, I remember seeing a photograph on a Daguerreotype plate, which showed some quite vivid colors in the dress of a doll. It was a photograph by Becquerel, and it seemed as though very little more had to be done to realize a perfect result; but that seeming has proved to be illusive; the colors were, to a large extent, accidental, and they were not permanent, and as a matter of fact very little more has been accomplished since that time in that particular line of working. The colors were due, not to any selective action of the light corresponding to them, but to quantitative effect. The principle was false.

The only substantial advance that has been made since that time has been made on the different principles of working, followed by Dr. Vogel and Mr. Ives; unless the recent announcement in connection with the achievements of Mons. Lippmann should prove to be true. For fourteen years past Mr. Ives has labored to produce color photographs by the composite method, believing that this was the only road by which success was to be reached."

After this introduction, Mr. Ives read his paper on "Composite Heliochromy," explaining the process with illustrations in natural colors upon the screen. After the exhibition, the following interesting discussion took place, viz.:

The chairman said photography in natural colors, as generally understood, was something different from what Mr. Ives had now shown. What had been wished, but hardly hoped for, was a photograph in which all the colors of nature would be reproduced on one plane surface, in one picture, directly in the camera, and by one print. Mr. Ives had not given them the whole loaf, but he had produced something which might perhaps be esteemed a good half of it. He had shown some very beautiful results, and had explained the means and the principle on which they have been produced with singular clearness and precision. He had shown that in the production of the photographs to form the basis of color photograph combination, not only had the character of the sensitive surface to be considered in photographing the radiations from particular colors, but also the screen to be combined with a particular quality of color-sensitiveness in the plate, and that the separate consideration of either screen or sensitive plate was useless. Mr. Ives's teaching and procedure in relation to the production of negatives for the production of color photographs were applicable not only to the kind of pictures he had shown that evening, but also threw a strong light on the principles to be followed in copying paintings and colored objects generally, with a view to rendering in correct monochrome all the different values of the color in the oil painting. He conceived that to be a very useful application of the principles now explained.

Professor Roberts-Austen, F.R.S., wished to express his appreciation of the extreme ingenuity displayed in the construction of

the camera, and in arranging these marvellous optical effects which had been shown. He had had the privilege of visiting Yellowstone Park, and could bear testimony to the extraordinary fidelity with which the marvellous color effects there seen had been reproduced.

Mr. B. Francis Cobb said there was very little room for discussion; they had simply to listen and learn, and admire the extraordinary results Mr. Ives had obtained. It had frequently been said that if ever color photography was to be achieved, it would be by some means at present little expected, or by some totally new appliance. Mr. Ives was certainly opening the way to what in future might lead to very great results, and he (Mr. Cobb) could only hope that Mr. Ives would continue the researches which all were watching with the greatest interest, and that later on he would come before them again with still further advances.

Mr. Van der Weyde asked if anything had been done in the way of portraiture by this method. He apprehended the exposure would have to be prolonged, and the light very strong, so that perhaps the sitter would have to close his eyes during the operation.

Mr. William H. Ward said he had had the opportunity last winter of seeing in Mr. Ives's own house in Philadelphia, several of the pictures now shown, and he could say that when displayed by sunlight they were quite fifty per cent. better. That would give some idea of the improved effect which would be obtained with a lantern fitted with an arc light.

Sir Henry Trueman Wood said it would be interesting if Mr. Ives could give some further information as to the way in which he regulated the exposure for each of the three pictures produced on the same film. As he understood, they were all produced simultaneously on one film and developed at the same time, and consequently the amount of exposure for each must be carefully regulated. It was obvious that the picture produced by the red rays must require a very much longer exposure than the one produced by rays of higher refrangibility; it would be interesting to know how it was done. One could understand that it might be regulated by varying the size of the aperture, or by other means.

A great deal of credit was due to Mr. Ives for the extreme ingenuity with which he had rendered practically useful a method which had been in the minds of a great many people for a long time, and which had been accomplished, with a varying amount of success, by previous experimenters. But Mr. Ives has certainly achieved in this particular direction a very distinct success. The practical application of it had yet to be seen, though it was not difficult to see that it had many possibilities of usefulness.

The chairman said he should like to know what kind of plate was most suitable for taking these negatives, and whether Mr. Ives had a preference for one particular kind of plate rather than another.

Mr. Ives, in reply, said he thought a special plate should be manufactured for this work, slightly modified from anything now on the market, but in order to make the operation sufficiently easy and convenient he had adopted commercial orthochromatic plates; the results shown were all obtained with commercial plates manufactured by Messrs. Carbutt, of Philadelphia. The one picture which would be seen in the heliochromoscope, a bouquet of English flowers, was taken on an Edwards isochromatic plate, which was very similar. There were two methods of securing simultaneous equal exposure for three pictures, the plates not being anything like so sensitive to red as to the other colors. If the three pictures were taken at one exposure through a single lens, the ray being divided after it passed through the lens, he had a number of ground and smoked glasses of different degrees of density, and having adjusted the color screen to give the density grades he wanted in the spectrum negative, he inserted one or more smoked glasses until he found three pictures developed together after the same exposure. He had another camera in which the pictures were taken on one film by three separate lenses, and in that case the diaphragms were varied; that for the red being much larger than that for the other two. It would be possible to take a portrait by this process now, but it would require an exposure of three or four minutes in a strong light. Plates could be specially prepared which would reduce the exposure in a strong light to possibly fifteen or twenty seconds, but inasmuch as the

process was not practically available for portrait-work at present, he had not troubled himself with experiments in that direction.

The chairman then proposed a vote of thanks to Mr. Ives, which was carried unanimously.

ELEMENTARY THEORY OF THE EQUIVALENT FOCUS.

BY PROF. HENRY CREW, LICK OBSERVATORY.

RECENT progress in the manufacture and use of photographic lenses indicates that the time is near at hand, if not already here, when the skilful photographer must have some accurate knowledge of the optical properties of the lenses he employs.

Take, for instance, the new enlarging lenses which have recently come into prominence. The user asks himself at once how a camera measuring eighteen or twenty inches from the front surface of the lens to the ground glass can make a picture on the same scale as an ordinary doublet having a focal length of sixty or a hundred inches.

To be sure, good photographs are daily taken by those who possess no knowledge of the chemistry of developers or fixing solutions; but such knowledge is a very great aid to him who wishes to push a little over the border, and into the unknown. Clear optical ideas may be classed in the same category.

The history of photography in this direction, viz., towards greater precision of detail, must in all probability follow the history of other sciences.

We venture, therefore, to offer the following short and elementary exposition of those laws of lenses which will be found most useful in practice.

No mathematics beyond elementary algebra and trigonometry will be employed, and no assumptions will be made other than the law of refraction at plane surfaces and the rectilinear propagation of light. The one thing especially necessary for a clear comprehension of this subject is that each individual step shall be mastered before proceeding to the next. The following notation; essentially that suggested by Seidel,* will be used throughout.

* For Seidel's notation and many examples illustrating the simplicity of it, see Steinheil und Voit's *Handbuch der Angewandten Optik* (Leipzig, 1891). The other books which have been of most help to me are *Traité d'Optique*, Mascart (Paris, 1889), *Geometrical Optics*, Heath (Cambridge Press, 1887).

NOTATION.

1. *Small Roman* letters indicate *points.*

2. *Roman capitals* indicate *distances.*

3. *First* letters of the *Greek* alphabet indicate *angles.*

4. *Other Greek* letters indicate *physical constants;* e. g., refractive indices are indicated by μ.

5. The *medium* to which any quantity refers is indicated by an *odd subscript;* e. g., the refractive index of the second medium is μ_3, not μ_2.

6. The *surface* of separation to which any quantity refers will be indicated by *even subscripts*, e. g., the radius of curvature of the third surface of a photographic doublet is R_3, not R_2.

7. Radii of curvature are *positive* when the convex side of the surface is turned *toward the incident light; negative* when the convex side is turned *away* from the incident ray.

8. Lengths measured in a direction parallel to the optical axis are positive in the direction in which the light is proceeding; negative, in the opposite direction.

9. Of similar quantities belonging to any surface (focal lengths or focal points for instance), those which refer to the right hand side will be primed; *e. g.*, F'_2 refers to the right-hand side of the first surface, while F_2 refers to the left-hand side.

For the practical purposes of this paper, we need only discuss a small cone of light whose angle is such that the sine, tangent, and arc may be considered equal.

Refraction at a Single Spherical Surface.—It will be necessary to first examine the case of refraction at a single spherical *surface*, in order later to take up refraction through a spherical *lens*, since refraction through a lens consists simply of successive refractions at surfaces.

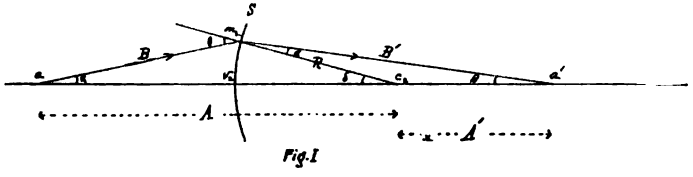

FIG. 1.—Refraction at a single surface.

Let S be a spherical surface having a centre at c_2 and containing a medium on the right whose refractive index is μ. The medium to the left, which we shall call the *first* medium, we shall take to be air, whose refractive index for our purpose may be taken as unity.

If we call v_2 the centre of the bounding surface, c_2v_2 will be the *optical axis* of the surface, and v_2 we will call its *vertex.*

Let us call R_2 the radius of curvature. According to the notation adopted, R_2 will be positive in fig. 1, where a is supposed to represent a luminous point.

We shall assume, what everyone has often proved for himself by direct experiment, that all the rays proceeding from a point, will after refraction at any number of spherical surfaces meet in a point.

Let a' be the point where the rays diverging from a meet after refraction at the surface S. Our present problem is to find a general expression for the position of a'.

Let:

$c_2a = A$, measured from c_2 towards a: in fig 1 A is negative.
$c_2a' = A'$, " " " " a': in fig. 1 A′ is positive.
m_2 = point at which any ray from a meets the surface S.
$m_2a = B$.
$m_2a' = B'$.
θ = angle of incidence.
ε = " " refraction.
δ = angle $m_2c_2v_2$.
α = " m_2av_2.
β = " $m_2a'v_2$.

Then from the triangle am_2c_2, one has

$$\frac{-A}{\sin\theta} = \frac{B}{\sin\delta} = \frac{R_2}{\sin\alpha} \quad \ldots\ldots\ldots \text{Eq. 1.}$$

and from the triangle $a'm_2c_2$, we have

$$\frac{A'}{\sin\varepsilon} = \frac{B'}{\sin\delta} = \frac{R_2}{-\sin\beta} \quad \ldots\ldots\ldots \text{Eq. 2.}$$

By definition:

$$\mu = \frac{\sin\theta}{\sin\varepsilon}$$

Eliminating $\sin\delta$ from Eqs. 1 and 2, one obtains

$$\frac{-A\sin\varepsilon}{A'\sin\theta} = \frac{B}{B'} = \frac{-A}{\mu A'} \quad \ldots\ldots \text{Eq. 3.}$$

From the general properties of triangles,

$$R_2 = -A\cos\delta - B\cos\theta \quad \ldots\ldots\ldots\ldots \text{Eq. 4.}$$
$$R_2 = B'\cos\varepsilon - A'\cos\delta \quad \ldots\ldots\ldots\ldots \text{Eq. 5.}$$

From the last three equations we may eliminate the two unknown quantities B and B′, thus:

$$B' = \frac{R_2 + A'\cos\delta}{\cos\varepsilon}$$

$$R_2 = -A \cos \delta + \frac{A\,B'}{\mu A'} \cos \theta$$

$$R_2 = -A \cos \delta + \frac{A \cos \theta}{\mu A' \cos \epsilon} (R_2 + A' \cos \delta)$$

$$-R_2 A \cos \theta + R_2 A' \mu \cos \epsilon = -A A' \mu \cos \delta \cos \epsilon + A A' \cos \delta \cos \theta$$

$$\frac{\cos \theta}{A'} - \frac{\mu \cos \epsilon}{A} = (\mu \cos \epsilon - \mu \cos \theta) \frac{\cos \delta}{R_2} \quad . \; . \; . \text{ Eq. 6.}$$

In this last equation, we have a general expression which serves to determine the position of the point a' in terms of the position a. It will be observed, however, that for any fixed position of a, the position of a' varies with the angle δ, or, in other words, the aperture of the surface.

In order to avoid the discussion of this variation of focal length (*spherical aberration*, as it is called), we shall consider the lens stopped down very small.

In the limit, which is practically reached in a stop of F-32 or F-64, the point m_2 in fig. 1 coincides with v_2,

$$\delta = 0$$

and

$$\cos \delta = \cos \theta = \cos \epsilon = 1.$$

Eq. 6 then becomes

$$-\frac{\mu}{A} + \frac{1}{A'} = \frac{\mu - 1}{R_2} \quad . \; . \; . \; . \; . \; . \; . \; . \; . \text{ Eq. 7.}$$

This gives us A′ in terms of the two measurable constants μ and R_2, and in terms of the distance of the luminous source A′.

The important thing to remember in the use of this equation is to give A and R_2 their proper signs, and to interpret A′ according to its sign. When A′ is positive the image is on the right of the centre C_2; when A′ is negative the image is to the left of the centre C_2. When this convention of signs is regarded there is no possible ambiguity in the equation.

Since this equation is of the first degree in A and A′, it is evident that for any one value of A there will be but a single value of A′. The converse of this is likewise true. Therefore all the rays which intersect in a' must intersect in a. This is equally true whether a is the image or the object.

Definition.—Two such points, viz., points the rays from either one of which after refraction intersect at the other, are said to be *conjugate points*.

If the positions of the conjugate points are measured from the vertex, instead of from the centre of the surface, Eq. 7 will take a similar but more useful form.

Let P_2 and P'_2 denote the respective distances of a and a' from the vertex of the refracting surface, v_2 in fig. 1.

Then

$$P_2 = A + R_2$$
$$P'_2 = A' + R_2$$

Eq. 7 then becomes

$$\frac{1}{P'_2 - R_2} - \frac{\mu}{P_2 - R_2} = \frac{\mu - 1}{R_2}$$

which transforms into

$$\frac{\mu}{P'_2} - \frac{1}{P_2} = \frac{\mu - 1}{R_2} \quad . \quad . \quad . \quad . \quad . \quad \text{Eq. 8.}$$

In refraction at a spherical surface, there are

Three Interesting Pairs of Conjugate Points.

The *first* of these is that where the luminous point is at an infinitely great distance to the left, the incident light is then parallel; the point conjugate to this is then known as the *second principal focus*, and the distance of the conjugate point from the vertex is known as the *second focal length.*

When the luminous point is in such a position that the conjugate point is at an infinite distance to the right, the luminous point is said to occupy the *first principal focus*, and the distance of the luminous point from the vertex is called the *first focal length.* Each of the focal points is, therefore, conjugate to a point at infinity.

The two planes which are perpendicular to the optical axis and pass through the first and second principal foci respectively are called the *first* and *second focal planes.*

To determine the *second* focal length, let

$$P_2 = -\infty$$

then Eq. 8 becomes

$$[P'_2] = \left(\frac{\mu}{\mu - 1}\right) R_2 = F'_2, \text{ say} \quad . \quad . \quad . \quad . \quad . \quad \text{Eq. 9.}$$

F'_2 being a special value of P'_2 obeys the same rule of signs; it is positive, therefore, when the second principal focus is to the right of the vertex; and negative when to the left.

It will be observed that when R_2 becomes zero, negative or infinite, that F'_2 also becomes zero, negative or infinite, and again when μ

changes from a quantity larger than unity to one smaller than unity, then F'_2 changes sign.

To determine the *first* focal length, let

$$P'_2 = +\infty$$

then

$$[P_2 =] \quad -\frac{R_2}{\mu - 1} = F_2 \text{ say} \quad . \quad . \quad . \quad . \text{ Eq. 10.}$$

It is important to note that these two focal lengths are not equal, but that

$$\frac{-F'_2}{F_2} = \mu \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \text{ Eq. 11.}$$

and

$$F'_2 + F = R_2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \text{ Eq. 12.}$$

For concave surfaces R_2 is negative; F_2 therefore becomes positive and F'_2 negative. By introducing the values of F_2 and F'_2 we may write Eq. 8 thus

$$\frac{F'_2}{P'_2} + \frac{F_2}{P_2} = 1 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \text{ Eq. 13.}$$

So far, we have measured our lengths from only one point at a time. In Eq. 7 this point was the center of the spherical surface; in Eq. 8 it was the vertex of the surface. But to put this fundamental equation in the simple and elegant form used by Newton,* the position of the *luminous* point must be measured from the *first* principal focus and the position of the *conjugate* point from the *second* principal focus.

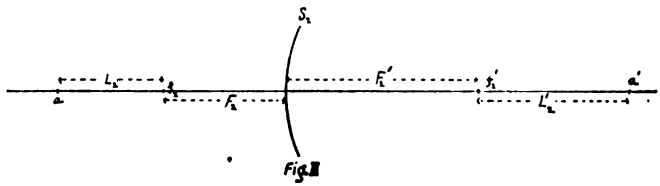

FIG. 2. Illustrating Newton's Rule.

Let us call f_2 and f'_2 the *positions* of the first and second principal foci respectively, and the distance of the luminous point from f_2 call L_2; and the distance of a' from f'_2 call L'_2, then

$$L_2 = P_2 - F_2$$
$$L'_2 = P'_2 - F'_2$$

Note that L_2 is positive when a is to the right of f_2, and negative when a is to the left of f_2, as in fig 2.

*Newton, *Opticks.* Third Edition (London, 1721), p. 9.

Eq. 13 now takes the form

$$\frac{F'_2}{L'_2 + P'_2} + \frac{F_2}{L_2 + F_2} = 1.$$

or $$L_2L'_2 = F_2F'_2 = \frac{-\mu}{(\mu-1)^2}R_2 \quad . \; . \; . \text{ Eq. 14.}$$

Since $F_2F'_2$ is essentially a negative quantity, it will be seen that if L_2 is measured to the *right* of the *first* focus, L'_2 will be measured to the *left* of the *second*, and *vice versa*. As the point in the first medium approaches f_2, the point in the second medium recedes from f'_2, in such a manner that the product of their respective distances is a constant. Note that f_2 and f'_2 are not conjugate points.

Second Pair of Remarkable Points. In this one of the points, and, therefore, also its conjugate, is at the vertex.

This is evident from Eq. 14 where if $L_2 = -F_2$, $L'_2 = -F'_2$. The vertex, therefore, possesses this remarkable property, that it possesses at the same time both image and object. To such points, in general, Listing has given the name *symptotic*.

These points are frequently met with in practice, *e.g.*, in determining the magnifying power of a microscope, by bringing the image to focus in the plane of the object.

Third Pair of Remarkable Points.—This pair is made up of two points which coincide at the centre. For, as will be seen from Eq. 7, when $A = 0$, then also must $A' = 0$.

Here also object and image coincide: but this point possesses the additional property that all rays of light directed towards it or radiating from it *pass through the surface without deviation.* This pair of points will assume great importance later when we come to the treatment of of lenses.

Case of Luminous Point not on Optical Axis.—Let b be a luminous point, not on the optical axis, and b' its conjugate.

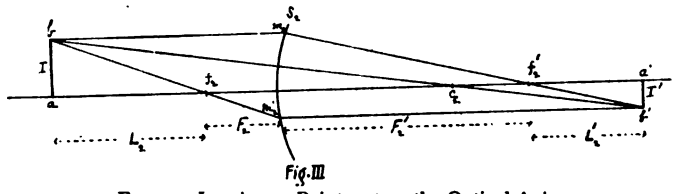

FIG. 3. Luminous Point not on the Optical Axis.

It will be seen that the point b' must lie on the straight line through bc_2 and the distance of b' from c_2 may be computed directly from Eq. 7.

Or the position of b' may be determined geometrically, thus:

AMERICAN JOURNAL OF PHOTOGRAPHY,

JULY, 1891.

FAC-SIMILE OF THE FIRST PORTRAIT MADE BY THE DAGUERREOTYPE PROCESS IN THE WORLD. TAKEN BY ROBERT CORNELIUS IN PHILADELPHIA, NOVEMBER, 1839.

NEGATIVE FROM ORIGINAL BY JULIUS F. SACHSE.

HALF-TONE BY PHILA. PHOTO-ENG. CO.

Draw the ray bm, parallel to the [illegible] at the [illegible] this ray must pass through the [illegible] f_2; its direction in the second medium is [illegible] In like manner, draw the ray, bf_2, through the [illegible] after refraction at m'_2, it will take the [illegible] to the optical axis; its direction in the second [illegible] determinate. The point b' at which these two [illegible] be the image of b. In the same manner [illegible] will give an image lying between a [illegible] will have for its image the line $a'b'$. But [illegible] defining the position of b' is to give the per[illegible] and then give the distance of a from the [illegible]

Let $$ab = I$$
and $$a'b' = I$$

We proceed to find I′ in terms of known [illegible] measured from the optical axis downwards are [illegible] upwards are called positive. We have, [illegible] triangles,

$$\frac{-I'}{I} = \frac{F_2}{L_2} = \frac{L'_2}{F'_2} = \frac{\sqrt{[illegible]}}{L_2 F_2} = \frac{[illegible]}{[illegible]}$$

or, $$\frac{-I'}{I} = \frac{P'_2 - L_2}{F'} = \frac{F_2 P'}{F' P_2}, \text{ by Eq. 1.}$$

This may be written thus:

$$\frac{+I' F_2}{P_2} + \frac{I F_2}{P_2} = 0 \quad \ldots\ldots\ldots\ldots \text{Eq. 1[illegible]}$$

So soon as the distance of an object from the vertex and the focal lengths of the surface are known, the computation of the position and size of the image from Eqs. 13 and [illegible] becomes a simple matter.

Reflection a Special Case of Refraction.— It is interesting to note that all the formulæ relating to mirrors, plane, convex or concave, may be derived from the immediately preceding by giving to n the value, —1.

The particular value, unity, indicates that the angle of incidence is equal to the angle of refraction, and the minus sign shows that the ray comes backward, instead of going forward.

For instance, from Eq. 9 one sees that the focal length of a concave mirror of radius — R_2 is

$$F' = -\frac{R_2}{2}$$

likewise from Eqs. 9 and 10, that

$$F_2 = F_2$$

(To be continued.)

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Draw the ray bm_2 parallel to the optical axis; after refraction at the surface S_2, this ray must pass through the second principal focus, f'_2; its direction in the second medium is, therefore, determined. In like manner, draw the ray, bf_2, through the first principal focus; after refraction at m'_2, it will take the direction m'_2b', parallel to the optical axis; its direction in the second medium is, therefore, determinate. The point b_2 at which these two rays intersect will evidently be the image of b. In the same manner, any point lying between a and b will give an image lying between a' and b': so that the line ab will have for its image the line $a'b'$. But the most useful method of defining the position of b' is to give the perpendicular distance from a and then give the distance of a' from the vertex, thus:

Let $$ab = I$$
and $$a'b' = I'$$

We proceed to find I′ in terms of known quantities. Distances measured from the optical axis downwards are called negative; those upwards are called positive. We have, therefore, fig. 3, from similar triangles,

$$\frac{-I'}{I} = \frac{F_2}{L_2} = \frac{L'_2}{F'_2} = \sqrt{\frac{F_2\ L'_2}{L_2\ F'_2}} = \sqrt{\frac{-L'_2}{\mu\ L_2}}$$

or, $$\frac{-I'}{I} = \frac{P'_2 - F'_2}{F'_2} = \frac{F_2\ P'_2}{F'_2\ P_2}, \text{ by Eq. 13.}$$

This may be written thus:

$$\frac{+I'\,F_2}{P'_2} + \frac{I\,F_2}{P_2} = 0 \quad \ldots\ldots\ldots \text{Eq. 15.}$$

So soon as the distance of an object from the vertex and the focal lengths of the surface are known, the computation of the position and size of the image from Eqs. 13 and 15 becomes a simple matter.

Reflection a Special Case of Refraction.—It is interesting to note that all the formulæ relating to mirrors, plane, convex, or concave, may be derived from the immediately preceding by giving to μ the value, —1.

The particular value, unity, indicates that the angle of incidence is equal to the angle of refraction, and the minus sign shows that the ray comes backward, instead of going forward.

For instance, from Eq. 9 one sees that the focal length of a concave mirror of radius $-R_2$ is

$$F' = -\frac{R_2}{2}$$

likewise from Eqs. 9 and 10, that

$$F'_2 = F_2$$

(*To be continued.*)

EARLY DAGUERREOTYPE DAYS.

AN HISTORICAL REMINISCENCE.

STRANGE as it may seem at the present day even the publication of this demonstration at first attracted but little attention in America, the matter not being taken seriously by the general public, while the scientific men of the day were, if possible, even more shy of the apparently minute description of Daguerre's invention, as many of them were yet smarting under the ridicule heaped upon them by their acceptance as truth of Locke's imaginary account of Sir John Herschel's lunar discoveries, with a forty-two-thousand power magnifier.

How slow they were in accepting this published account as truth, is shown by the fact that no notice whatever was taken of the subject at the Stated Meeting of the American Philosophical society at Philadelphia, held October 18th, 1839, then one of the most active scientific organizations in America. While at the Wistar party, held on the next evening, Saturday, October 19th, at the house of Job R. Tyson, southwest corner of Fourth and Prune streets, all persons present being members of the American Philosophical Society, the matter was brought up as another grand hoax, similar to the one mentioned above, which had so sadly been imposed upon many present.

In fact, one of the leading members present, a professor in the University of Pennsylvania, relieved himself of a lengthy opinion in which he characterized the whole matter as not only improbable, but an impossibility, and in conclusion pronounced the whole report a ludicrous fabrication of some great wag or the emanation of a lunatic's brain. This opinion of the learned professor was concurred in by all the scientific philosophers present.

JOSEPH SAXTON.

Among those whose notice was attracted to the publication was one Joseph Saxton, an attaché of the United States Mint in Philadelphia, a man of culture and great scientific accomplishments. When Mr. Saxton read the account in Poulson's *Adver-*

tizer,* it seemed so clear and feasible that he at once concluded to try the process according to the directions as set forth in the newspaper.

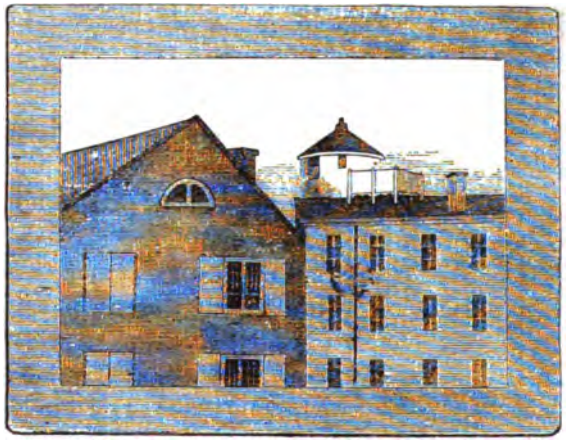
From Photograph by Brady, in Album of American Philosophical Society.

A segar-box was improvised as a camera, while an ordinary burning glass, consisting of a convex lens, was fixed in at one end and made to do duty as an objective. A paste-board Seidlitz powder box, containing some flakes of dry iodine, and a cut-out in the lid somewhat smaller than the plate, answered all purposes of a coating box. For a mercury bath the ingenious experimenter mortised a block of hard wood, attaching underneath a globular bottom of sheet iron, so as to hold the quicksilver and allow the application of a spirit lamp beneath. A piece of polished silver ribbon one and one-quarter by two inches, such as coin blanks are cut from, served in lieu of the copper plates.

When all preparations were completed the ingenious Saxton set his apparatus on the window sill of one of the second story north windows of the mint, and pointed it northeastward towards the sunlit buildings beyond. After the exposure the instructions in the newspaper were followed to the letter amidst the ridicule of the other attachés who were present, but to the great surprise of the latter and joy of the experimenter, the attempt resulted in a perfect picture. There, permanently impressed upon the silver plate, was the picture of the old Philadelphia High School and the State Arsenal, which then stood upon the site.

* An old member of the Philosophical Society who was active at that time claims that Saxton's experiment was made a month previous (September, 1839), shortly after the letter to A. D. Bache, above quoted, and before it was published. Careful investigations by the writer, however, seem to point to the latter date, October 16th, 1839, as the correct one.

Joseph Saxton had proved the truthfulness of the published account of Daguerre's invention, and had made the first heliograph in America of which we have a positive knowledge.



Original now in possession of Historical Society of Pennsylvania.

On the next day Saxton succeeded in making several other pictures of different buildings, all taken from the same window.

Joseph Saxton was a native of Pennsylvania, and a born mechanical genius; in scientific attainments he had few superiors, while in the higher mechanics he stood without an equal.

At the time when the advices of Daguerre's process reached America, Joseph Saxton, who was by profession a scale maker, was connected with the weighing and assay department of the United States Mint, at Philadelphia, where a *chef d'œuvre* of his skill may still be seen in the assay office. This consists of a pair of scales for analytical purposes; the beam is of palladium, and so accurately is the instrument balanced that one-tenth of a milligram (.00154 grain Av.) turns the beam, and this after half a century's use. He also invented a medal-ruling machine, which he exhibited in London about the year 1829. This ingenious device he afterward perfected and improved so that it would copy a medal or coin automatically by steam power. So rapid and true did this device work that a disk of a coin an inch in diameter was

engraved in half an hour, the number of lines traced counting two hundred to an inch.

Specimens of the marvelous results obtained by this machine, which are not even surpassed for fidelity to the original by any photographic process of the present day, may be seen in *The Manual of Gold and Silver Coins of all Nations*, by J. R. Eckfeldt and W. E. Du Bois, *Philadelphia, 1842.* The book is to be found in all large libraries.

Joseph Saxton was also a pioneer in the art of galvano-plasty, and was the first person to practically apply the electro-galvanic process for the mechanical reproduction of photographic impressions.

About the year 1843 this ingenious mechanic was called to the National Department of Weights and Measures at Washington, where he remained until his death, Oct. 16, 1873.

Saxton's heliographic results, upon being shown to interested parties, at once created a great stir in scientific circles, one of the first effects being the publication in the *Journal of the Franklin Institute* (November, 1839), of an original translation from the French of Daguerre's process by Professor J. F. Frazer, who also succeeded in producing a daguerreotype from this description, viz.:

Practical description of the process called *Daguerre*, which consists of the spontaneous reproduction of the images of natural objects, in the *camera obscuro*, not with their colors, but with great delicacy in the gradation of tints, by Daguerre.

The scientific fraternity was now thoroughly aroused. Many who at first received the whole matter as another huge hoax, and left no opportunity pass to ridicule the published accounts, now became most enthusiastic advocates. Theories multiplied daily, but with all this the time of exposure was not yet brought within the demands for portraiture. Here again we find a practical man with the aid of common sense accomplishing that which theoretical scientists held to be next to impossible.

Robert Cornelius.

To Robert Cornelius, of Philadelphia, is due the honor of having produced the first successful portrait of a living person by

the Daguerre process. This was accomplished in the yard back of his store and residence, [old] 176 Chestnut Street, above Seventh (new number 710), in Philadelphia.

How Robert Cornelius, who was a lamp-maker and a metal worker, became interested in Daguerre's invention, is best told in his own words to the writer, viz.:

"Mr. Saxton, who was then connected with the United States Mint, had the opportunity of receiving an early notice of the manner in which Daguerre was operating. He very soon produced a picture from the second story of the mint,—a view of chimneys and tops of houses. He was anxious to continue the experiment, and called upon me, and showed his experiment, and explained to me the manner of doing it, and desired me to prepare some plated metal to experiment with. With pleasure I complied with his request. It was our business to make a great variety of articles of plated metal (copper coated with silver). Very soon afterwards I made in the factory a tin box (and boxes, according to Saxton's description), and bought from McAllister, No. 48 Chestnut Street (now 206 Chestnut Street), a lens about two inches in diameter, such as was used for opera purposes (called achromatic). With these instruments [*i.e.*, a tin box for a camera, and this lens.—ED.] I made the first likeness of myself (see frontispiece), and another one of some of my children*, in the open yard of my dwelling, sunlight bright upon us, and I am fully of the impression that I was the first to obtain a likeness of the human face" [by the Daguerre process.—ED.].

In a subsequent communication in reference to this picture, Mr. Cornelius writes:

"You will notice the figure is not in the centre of the plate. The reason for it is, I was alone, and ran in front of the camera after preparing it for the picture, and I could not know until the picture was taken that I was not in the centre. It required some minutes with iodine to produce the effect."

Unfortunately the exact date of this successful experiment at portraiture has not come down to us, nor is Mr. Cornelius able to recall it to a certainty. That it was not long after Saxton's experiment is however proven by the fact that one of the pictures was shown by Dr. Robert M. Patterson, a director of the

* This second picture is still in existence.

Mint, at the regular stated meeting of the American Philosophical Society, December 6th, 1839, and the fact is so recorded upon the minutes (Proc. A. P. S., Vol. 1, 155).

It was not until a month after this exhibition, December 6th, 1839, of Cornelius effort, that the first French Daguerreotype reached America. This was obtained in Paris by Mr. Henry Seybert and sent to the American Philosophical Society, it was shown at the regular meeting, January 3d, 1840 (Proc. A. P. S., Vol. 1, p. 169).

A comparison with Saxton's early efforts showed that they were equal if not superior to the French specimen of that early day, while Cornelius' and Goddard's efforts were far in advance of the French production.

THE FIRST STUDIO.

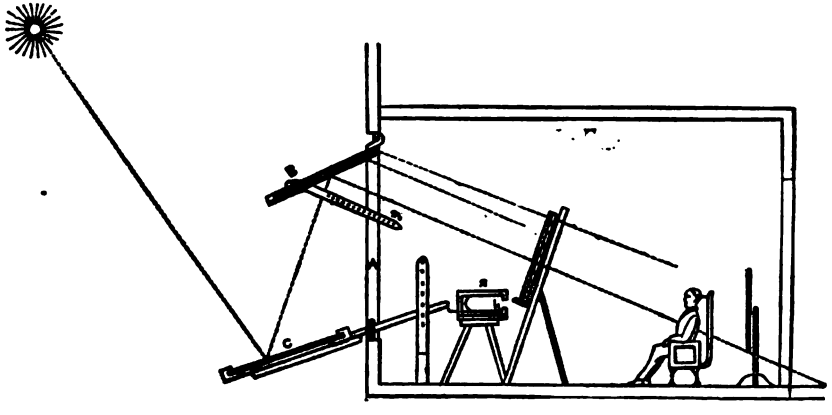
Spurred on by his success in portraiture, Robert Cornelius now devoted considerable time to heliographic experiments, and the perfection of the process for protraiture. These progressed so satisfactorily that early in the year 1840 the second-story room in the building at the northeast corner of Eighth Street and Lodge Alley (now Jayne Street), above Chestnut, was secured and arranged for Daguerrean portraiture, the first heliographic studio in America.

The method employed to concentrate light upon the sitter, consisted in a series of reflectors set at different angles, together with the use of blue glass to screen the sitter. The time for a sitting averaged about one minute. The plan of this arrangement is reproduced in the accompanying cut.

A, the window with sashes removed. *B* and *C*, large looking-glasses mounted as plain reflectors, the lower one (*c*) having rotary motion upon the saddle, resting upon the sill of the window in order to direct the rays upon the reflector (*B*) at any hour of the day—the vertical motion of the reflector *c* being necessary, the sun varying in altitude so much during the hours most favorable to the production of portraits. The lower reflector was kept in the required position by a lever, upright post, and bolts. The upper reflector was hinged at its upper end at the top of the

window frame, the only motion necessary being that which would reflect upon the sitter the incident rays from the lower reflector,—the reflector *B* being kept at the required angle by the connecting lever *m*.

In front and between the sitter and the reflector, upon a proper stand, a screen was placed to protect the eyes of the sitter. After a short time this was replaced by Mr. Cornelius by a screen of blue glass suspended from the ceiling. This screen was another



Plan of the first photographic studio.*

example of the operator's ingenuity. At that early day no glass of sufficient size was to be had, so a quantity of ordinary blue window glass was obtained and holes drilled through the corners, and several sheets were thus wired together to increase the size, and when complete was suspended from the ceiling in its proper place, and so arranged that when a person was sitting this glass screen could be moved to and fro, the object being to prevent shadows on the face of the sitter produced from the uneven surface of the glass.

It is an interesting fact that the necessary apparatus, such as cameras, plates, mats, coating, boxes, &c., was all made by Mr. Cornelius personally. The lenses were imported or made for him by McAllister, the Philadelphia optician.

In connection with this matter we reproduce a copy of the first successful studio picture, the father of the writer, taken by Mr. Cornelius, in his new establishment. It is a representative

* Footnote will appear in a future number.

specimen of his skill and proficiency, and the perfect condition of the miniature attests the permanency of his early efforts.

Considerable success attended Mr. Cornelius with his new equipment, a leading feature being an increase in the size of the image. Thus on March 6th, 1840, we again find a notice of his progress chronicled in the Proceedings of the Philosophical Society; viz.:—

"Dr Patterson exhibited some specimens of the heliographic art (Daguerreotype) of a large size, executed by Mr. Robert Cornelius, of Philadelphia, and stated to the Society that Mr. Cornelius had succeeded in obtaining beautiful representations upon highly-polished silver plate." (Proc. A. P. S., Vol. 1, p. 181.)

Daguerrean protraiture in Philadelphia was now an established fact, and it is a matter worthy of record that the first paying sitter was John McAllister, the leading optician of Philadelphia, whose establishment was then at No. 48 (No. 206) Chestnut Street, and who had furnishsd the lenses for all the early investigators.

DAGUERROTYPE MINIATURES.

Mr. Cornelius' enterprise attracted much attention among the wealthy and scientific classes, and brought many sitters to the establishment.

An interesting item for the professional of to-day, who furnishes a dozen cabinets for a dollar, or who turns out thirty-six tintypes for a quarter, is, that so great was the rush for the Daguerreotype miniatures, as they were then called, that prospective sitters had to be "booked" a week ahead at $5.00 for each sitting. Each received their day and hour, subject of course to sunshine. No pictures were attempted in cloudy weather.

It is stated that the total time consumed to turn out a finished *Daguerreotype miniature* was ten minutes; this included one minute for exposure.

Some of the larger pictures yet in existence were mounted in ornamental brass frames, which were cast, chased and lacquered, and intended to hang against the wall similar to an ordinary painting.

Another curious custom was that when a clergyman wanted

his miniature with a white neck-kerchief he was requested to substitute a bright blue silk for his snow-white cambric, as blue always came out white, but white often came out blue, and to insure success a substitution was always recommended or insisted upon.

The same course was pursued when a lady wanted to appear in a white or bridal costume.

Just how long Robert Cornelius continued in the Daguerreotype business commercially is difficult to determine to a certainty, but it is thought not to have extended much over two years.

About a year after the "Atelier" at Eighth and Lodge Alley was established, Mr. Cornelius removed his establishment to larger quarters on the south side of Market street, six doors above Eighth street. His public announcement of this fact sets forth, viz. :—

"DAGUERREOTYPE MINIATURES.—R. Cornelius respectfully announces that he has resumed the taking MINIATURES, and invites the public to call at his rooms, No. 270 MARKET ST. (now 810), where specimens of the art can be seen. The recent improvements are such that miniatures can be made in the shade and without regard to the state of the weather. j 16. 1ms."

Public Ledger, July 1st, 1841.

The last positive record we have relating to Cornelius as a professional heliographer is the entry upon the minutes of the stated meeting of the Am. Philosophical Society, April 15th, 1842, stating :—

"Mr. G. W. Smith presented some Daguerreotype portraits made by Mr. Cornelius by an improved process, an important part of which was the greater polish given to the plate, and the absence of cross lines."

To prepare the highly polished Daguerreotype plate so that the surface should be free from the annoying cross lines, such as appear upon the specimen of early studio portraiture which we reproduce, was the great aim of all the experimenters in heliography. As is shown by the above report, Cornelius was the first to overcome this difficulty, and the improvement was counted of sufficient importance to present to the Philosophical Society.

It was Mr. Cornelius' knowledge of working metals and pro-

fessional skill in polishing silver plate, together with Dr. Goddard's chemical discovery which accounts for the great superiority of his early Daguerrotype miniatures.

When Mr. Cornelius finally retired from this enterprise it was for the purpose of devoting all of his time to his legitimate business, which was then assuming large proportions, through the more general introduction of illuminating gas, which brought about an increasing demand for gas fixtures. Mr. Cornelius, however, still maintained his interest in Daguerreotypy, and lost no opportunity to advise and instruct others. In a note to the writer covering this ground he states :—

"When I ceased the business I closed it, and did not sell out to any one. I instructed (gratuitously) very many persons, some of whom commenced business on their own account."

Among the parties so instructed by Mr. Cornelius, was the late Marcus A. Root, who for many years was one of the foremost Daguerreotypists in the United States. One of the great points of the Root pictures, in which they excelled all others, was the exquisite polish of the plates, a process imparted to him by Mr. Cornelius. (*To be continued.*)

ADVICE TO LANDSCAPE PHOTOGRAPHERS.

XANTHUS SMITH.

IT is an excellent motto that anything that is worth doing, is worth doing well, and one that applies particularly in photography.

If we would always follow the rule that we should give full consideration to the matter of taking a picture, we are quite sure that there would be many more excellent photographs in existence, and infinitely fewer bad ones. In our eagerness to secure a portrait or a view, how often do we fire away at haphazard at our subject, trusting to luck for a fortunate result from our attempts, when we should really have proceeded cautiously, weighing and considering and looking upon our subject with a

careful eye, as to what its appearance would be in the finished print.

In the pursuit of landscape photography we probably find more careless work than in any of the other branches. The reason for this is, that our subjects are so much less under control in the manner of arrangement and lighting than are indoor groupings, and in addition we are so much at the mercy of the weather in out-door work, that it is no wonder that we often make attempts, when we had far better leave the work undone.

When we take fully into consideration what really constitutes the most favorable conditions for landscape photography, and how seldom these conditions actually pertain, we almost become disheartened at the very outset from attempting a branch of photography which must on the one hand give us many spoiled plates and unsatisfactory prints, or on the other an exceedingly small number of really good and valuable works, secured at cost of much pains and a very great deal of time.

Let us inquire what are the most favorable conditions for landscape photography? A considerable amount of atmosphere certainly, varying with the range of our view; as, if our scene embraces an extended distance, of course the prevailing haziness should be much less than in more confined views. When our scene is much shut in, and the nearer portions form the principal object of our picture, a very great amount of haziness will often enhance the beauty of our work very much, by subduing the further portions, giving relief to the nearer, aiding the perspective, and altogether adding to the sentiment of the work by giving a certain amount of mystery.

Flying clouds are indispensable to the perfect rendering of many extended landscape scenes. The broad shadows which they cast upon certain passages give relief, and make the picture effective, as painters say. To secure the true value of these passing shadows, it is necessary to study the scene to be depicted for a considerable time, in order that we may determine which of the passages of our scene should be subdued or merged in shadow, and which remain in clear sunshine. By securing the

happy moment for the exposure of our plate we will convey the time at which the most objectionable lines in our picture are lost in shadow and the most graceful and harmonious brought out in bold relief.

Any good landscape subject deserves a number of visits prior to an attempt at portrayal of it, simply to determine what are the most favorable conditions of light and shadow, that is direction of light, not only as to whether the sun's rays should strike from the right or the left; but whether a high and brilliant illumination is preferable to that of a declining sun with extended shadows, the latter giving more breadth and sentiment, and the former more brilliancy of effect.

Serenity of atmosphere. What can we do in landscape photography with a constantly disturbing wind blowing? Really nothing, when foliage constitutes any portion of our work. Here the instantaneous shutter avails us nothing. The most perfect rendering of foliage necessitates a large amount of detail in the shadowed portions, which is only got by a snfficiently long exposure to impress the under passages, from which the direct light is cut off by over-tapping boughs. The stems and inner portions of trees when in shadow are much the same in regard to lighting, as objects in ill-lighted apartments, and the range is so great between these portions and the brilliant reflected lights upon outer masses of glossy leaves, that it is only the most careful exposures that can produce a harmonious rendering of beautiful foliage.

It is in vain that we attempt to make our exposures by uncapping and capping during the lulls and puffs of wind in working in windy weather, for even if we have the good luck to catch a comparative calm, we are sure to find, on developing our plate, that some portion of our picture is blurred, and most likely in the foreground, where the securing of crisp definition would most have enhanced the beauty and value of our work. We all know, too, how the charms of most landscape views are enhanced by passages of water, and above all by reflections, which by doubling the features composing the shore line, add fulness and interest,

and act as supports to their masses of light and shadow, all of which we are completely debarred from getting in windy weather, when the surface of the water is so disturbed that we have nothing in its place in the photograph but a harshly cut out white patch, destroying the unity and tone and sentiment of the picture. Generally also, in windy weather, the atmospheric haze is carried away, and consequently the aerial perspective. The advantage of working during the prevalence of a considerable amount of atmosphere is too little appreciated in this country.

There is no doubt but that the English photographers excel us Americans in landscape photography, and mainly for two reasons, the first being their appreciation of atmospheric effects, which is no doubt a result of their moist climate, and the second the extreme pains which they are willing to take in order to secure an effective picture.

In this country we are too prone to work on excessively clear days, when the atmosphere is robbed of moisture and the aerial perspective is utterly destroyed. Such days are the ones upon which the majority of people most admire views, because everything is distinctly revealed to the eye from the foreground to the extreme distance; but they are not the days for making artistic pictures, as we have neither perspective nor sentiment, two of the most important qualities in landscape pictures.

So aware are the English of the necessity of aiding the perspective in conveying a scene upon a flat surface, that in addition to the softening effect produced upon the more distant portions of a view by mistiness in the air, or when such condition does pertain to a sufficient extent, they use much larger stops in order, by blurring the distance, through inaccuracy of focus, to drive it off, as it were, and thereby secure an emphasis and consequent advancement of the foreground passages. Then Englishmen, or at least those who furnish us with the best landscape work, do not go off for a day and fire away a dozen or more plates, and hurry home to develop them the same evening, when fatigued, though impatience to see the result of the day's work. In contrast to this we have heard of a man, in Scotland, trying and

waiting for years before he succeeded in getting successfully a view which he was anxious to secure, under the most perfect conditions of lighting and effect; and we know of those who, having secured a few careful exposures during the summer, have spent much of the following winter in developing and printing them. Such is not only the way to attain a high standard of excellence in anything, but also to make it instructive and improving to ourselves and to others.

Not that we would recommend a cautiousness of procedure altogether equalling the extreme ones to which we have just referred, because such a method, while a part as it were of John Bull's very being, is altogether incompatible with our American go-ahead temperament, and then in the matter of photography the element of luck, we cannot deny, plays so important a part that we may often venture exposures of plates even when the conditions appear to be very unfavorable. We all know how some chance shot, from which we have expected nothing, will give us one of our most successful pictures. Let us enjoin, though, a large share of time and pains and consideration, to landscape photographers. The higher we aim the better, for if we do not always attain the success which we have conceived possible to us, the standard of excellence of our work will certainly be far above that of the careless, hurried worker, who does not consider his pursuit worthy either of the time or the pains which it deserves.

SOME CONDITIONS OF INFLUENCING THE WELFARE OF PHOTOGRAPHIC SOCIETIES.*

BY W. H. HARRISON.

A photographic organization may be prosperous in its intellectual capacity, as it may be prosperous in its funds and the number of its members; it may also be prosperous in both. When it is but materially rich, a local society may go quietly and comfortably on its way, and be little esteemed outside the

*Read before the Clapham Camera Club.

limits of its own parish; when, however, its intellectual powers add considerably to the progress of photographic art and science, its discoveries attract the attention of the world.

That a local society should raise itself above the dead level of the general run of such organizations, it is necessary that each individual member, when time and opportunities permit, should take up some special work, and afterwards place the results before the whole body of the members. In reading the records of the average proceedings of local photographic societies, one would suppose that none but silver and a few other processes existed, and that we have nothing to talk about at our meetings but the working of common processes connected with the plates, films, and papers ordinarily sold in commerce. What is wanted is, that one member shall say, "I will carry on novel photographic researches with the salts of iron;" that another shall resolve to do the same with uranium salts; that others shall experiment with the salts of nickel, cobalt, and other metals; that one member shall take up the primuline process and discover its possibilities, and so on, so as to get away from the mere common processes, and to discover new things about the others. We should also have men quitting the beaten track in matters artistic. The finest artistic effects in photographic printing are, I think, produced by Klio's—better known as the "photogravure"—process, yet where is the amateur who works the same? Dr. Emerson announced his intention of beginning to work at it, but I have not yet heard of the results.

I do not believe in appointing committees to conduct such investigations from a pious sense of duty, and a mere belief that the work ought to be done. It is for the individual to strike out new paths, not as a task, but as a pleasure; it is for each of our younger members to resolve to no longer live as a nonentity, but to do something to increase the store of human knowledge, and to stand out as a benefactor of the race.

What dreary reading is to be found in the local society reports in the photographic press! We are, perhaps, informed therein that Mr. Jones sat down amid loud applause after reading a

valuable paper—in which the reporter can find nothing worth printing. Sometimes we are told how J. Smith, Esq., J. P.—a man knowing nothing of photography—honored the photographic society of Little Pedlington with his presence, and how all the members grovelled before him. I think that the editors of all photographic papers will thank me for speaking of the lack of general interest and of useful information in the average reports of the local societies; they cannot well leave the reports out, because their circulation might then fall in the various localities. Let, then, some of the energetic young men connected with this Club bring in some results of original research, and make the reports of our proceedings worth reading.

THE SPRING MEETING OF THE LEOPARDVILLE CAMERA CLUB.

Editor AMERICAN JOURNAL OF PHOTOGRAPHY:

After an absence of several months I have again returned to my native heath, and once more venture to inform you of local photographic happenings.

In my search for an item of interest I dropped in at the spring meeting of the Leopardville Camera Club. To my surprise, I hardly recognized the former society. A change had come over the same since my last visit several months ago,—discontent and despondency reigned supreme where formerly joy and happiness were enthroned. Sadness and gloom overspread the faces of the members who were usually so smiling and happy,—despair and disappointment were impressed upon the countenance of the genial secretary, while several of the other officers, heretofore so affable, were dejected and melancholy.

All seemed to indicate that some great calamity had overtaken the club, yet a close inspection showed the presence of the treasurer, and failed to note an empty chair throughout the room.

Even after the meeting was called to order, no life or spirit was manifest in the proceedings. The secretary read his minutes without the usual snap, and even the president's approving nod was slow and sad.

When finally the committee reports were reached, the cause of this lugubriousness became apparent.

In an evil hour the club had resolved to participate in a joint exhibition with two sister clubs of other towns, the exhibition to be held at Beanville, under the auspices of the Beanville Hypo Club, the judges of awards to be Moses Pumpernickel, Raphael McAngelo and J. Emerson Trotter,—three artists of reputation in their special lines of art.

Great were the preparations made for this display by the little coterie of the club, to whose lot invariably fell the honors of the local exhibitions.

The thought that they might be ignored in the distribution of awards was never for a moment a matter of consideration, at all the various displays of the club the interested few invariably took the honors, as it was a foregone understanding for whom the votes were to be cast.

At the combined show, however, the case was different; the artist committee, Messrs. Pumpernickel, McAngelo & Co., failed to become impressed with the importance of the social magnates of the Leopardville Camera Club, and by the adoption of similar tactics awarded the chief prizes to members of their own club and their friends, thus ignoring almost entirely the expectant and self-confident Leopardites.

It was a few days prior to the spring meeting when the account of the Beanville committee's action reached Leopardville. As a sequence, loud and deep were the anathemas heaped upon the Beanville Club. It was this incident which cast the green fog of despair over the developing expectations of the flower of the Leopardville Camera Club upon the night of the meeting.

After the report was read before the society, considerable discussion ensued, in which Pumpernickel & Co. came in for the lion's share of abuse; the usual charges of fraud, partiality, venality, etc., were indulged in.

It was all to no purpose, however, there was no appeal; Beanville had the medals, while Leopardville, with the exception of a few worthless crumbs, was ignored.

An attempt was made to heal the wounded feelings of the dis-

appointed exhibitors by showing that Pumpernickel was in fact only a calciminer, McAngelo a sign painter, and Trotter a house decorator and grainer, and that not a single one of the committee could tell the difference between a silver-print and a photo-lithograph, yet all this did not give them a medal.

Several denunciatory resolutions were also proposed and seconded, but failed, as they were not vindictive enough nor strong enough in expressed contempt towards the Beanvillians.

When the meeting finally adjourned, it was quietly agreed upon not to publish the minutes of the proceedings of the night, as it would only put upon record the discomfiture of Leopardville's photographic magnates, around whom the whole club is supposed to revolve. —J. FOCUS SNAPPSCHOTTE.

PRELIMINARY ADDRESS OF THE COMMITTEE OF THE WORLD'S CONGRESS AUXILIARY ON A CONGRESS OF PHOTOGRAPHERS.

THE World's Columbian Exposition of 1893 is intended to commemorate the progress of civilization, and be an incentive to further development, not only by displaying the best products of men's thoughts, as shown in material things, but also by bringing together for conference, in a series of Congresses, the leading thinkers, workers, and artists of the world. The World's Congress Auxiliary has been organized with the approval and support of the Exposition authorities, and of the Congress of the United States, to have general charge of these Congresses. Audience rooms, sufficient in number and capacity, will be provided by the Directory of the Exposition.

Among the Congresses of the Columbian Exposition of 1893, that to photography should rank high and be, as it undoubtedly will, a permanent benefit to the civilized nations of the earth. The advancement that has been made in photography, and the processes dependent upon it, within the last twenty years has astonished the artists and scientists of the world. By its aid, the astronomer has discovered countless stars and remodeled the map of the starry heavens. It is extensively used in almost every de-

partment of art, literature, and science. Its future possibilities are too great for any one to estimate.

It is the design of the Committee to have men and women, who have become distinguishnd in the various departments of the photographic art, and the processes dependent upon it, deliver papers before the photographic congresses which shall contain their best thought, and after well-regulated discussions, shall become the property of the World's Congress Auxiliary, and if deemed worthy, be published in the Encyclopedia of proceedings.

The following are suggested as some of the topics which may appropriately engage the attention of the Photographic Congress:

The History and Development of Photography, The Present and Future Possibilities of Photography, Emulsion Photography, Photographic Chemistry, Microscopic Photography, Portrait Photography, The Production of Photographs in Natural Colors, Photographic Apparatus, Landscape Photography, Photographic Mechanical Processes, The Best, Cheapest, and Most Rapid Photographic Process for Illustrating Books, Newspapers, etc.; The Latent Image and Its Development, Photo Legal Photography, Photo-Medical Photography, Astronomical Photography, Amateur Photography, Photographic Optics, Orthochromatic Photography, Carbon Printing, Silver Printing, Platinum Printing, Photography as an Aid to Education, Photography by Artificial Light, Aerial Photography, Submarine Photography, Instantaneous Photography.

The Congress of Photographers will be held in Chicago some time during the month of August, 1893.

The Committee in charge of the arrangements for the various meetings of the Photographic Congress must, of necessity, be composed of persons resident in or near Chicago, to enable them to attend the meetings of the Committee. But to give the Auxiliary the benefit of the advice and counsel of persons skilled in the art-science of photography throughout the United States and the other countries of the world, and to make the Photographic Congress representative of the important interests and topics to be considered, Advisory Councils of the Photographic Congress have been, and will be, appointed from time to time.

These Advisory Councils will be composed of persons skilled in this department of Art-Science throughout the world.

It is desired that photographic societies and conventions, wherever held, shall send to this committee the names of such persons as they consider best fitted to represent them, either by the presentation of papers for the Congress, or by taking part in its discussions.

The Committee also wishes to receive suggestions as to methods of work, topics for discussion, and suitable persons to treat special subjects.

The Advisory and Honorary Members of the Congress are particularly requested to interest themselves in this direction, and to make such suggestions as they may deem proper. Photographic periodicals and individuals to whom this address is sent, are also invited to make such suggestions and recommendations at the earliest possible moment, to the end that they may be utilized by the Committee in forming the final plans in pursuance of which such Photographic Congresses will be held.

JAMES B. BRADWELL, Chairman.
GAYTON A. DOUGLASS, Vice-Chairman.
C. GENTILE,
MAX PLATZ,
M. J. STEFFENS,
ALEX. HESLER,
W. J. ROOT,
BERNARD EICHELMANN,
Committee.

NOTE.—Inquiries and communications, in relation to the proposed Photographic Congress, should be addressed to

JAMES B. BRADWELL,
Chairman of the Committee of the World's Congress
Auxiliary on a Congress of Photographers,
April 19th, 1892. Chicago, Ill., U. S. A.

ADVISORY COUNCIL.

The members of the Advisory Councils of this department, thus far appointed, are:

Arkansas—R. W. Dawson, Little Rock.

California—S. W. Burnham, San Jose.

Colorado—W. H. Jackson, Denver.

Connecticut—Charles Stuart, Hartford.

District of Columbia—Professor T. W. Smillie, Smithsonian Institute, Washington.

Georgia—C. W. Motes, Atlanta.

Indiana—W. H. Potter, Indianapolis.

Iowa—A. E. Monfort, Burlington.

Kentucky—H. Veasey, Louisville.

Louisiana—T. Lilienthal, New Orleans.

Maryland—R. Walzl, Baltimore.

Massachusetts—Frank Rowell, Wilfred A. French, H. G. Peabody, Boston.

Michigan—W. F. Sesser, St. Joseph.

Minnesota—T. M. Swem, St. Paul.

Mississippi—A. L. Blanks, Vicksburg.

Missouri—F. W. Guerin, M. A. Seed, G. Cramer, St. Louis.

New Hampshire—W. G. C. Kimball, Concord.

New York—A. Bogardus, Henry J. Newton, Dr. Charles Ehrmann, P. C. Duchochois, W. I. Lincoln Adams, Dr. Arthur Elliott, New York; George Eastman, Rochester; Anton Wild, Buffalo; Edward Bausch, E. Gundlach, Rochester; Catharine Weed Barnes, Albany.

Ohio—James F. Ryder, Cleveland; M. Wolfe, Dayton; James Landy, Cincinnati.

Pennsylvania—John Carbutt, F. Gutekunst, C. R. Pancoast, F. E Ives, Philadelphia.

Rhode Island—P. H. Rose, Providence.

Wisconsin—W. H. Sherman, S. L. Stein, Milwaukee; E. R. Curtiss, Madison.

New Mexico—T. Crispell, Las Vegas.

Utah—C. R. Savage, Salt Lake.

Canada—J. F. Bryce, Toronto; A. Henderson, Montreal.

FOREIGN.

England—Mr. Andrew Pringle, Cromwell House, Bexley Heath, Kent; Mr. W. Jerome Harrison, Board School, Ichmield St., Birmingham; Mr. H. P. Robinson, Winwood, Tunbridge Wells; Captain W. deW. Abney, Chapman Jones, J. Traill Taylor, T. C. Hepworth, London; Mr. Cimbrano, W. Willis, Camera Club, London; Frank Sutcliff, Yorkshire; Henry Sturmie, Bradford; W. T. Wilkinson, Leicester; Professor Raphael Meldola, London; A. R. Dresser, W.

Van Der Weyde, W. E. Debenham, W. Bedford, Camera Club, London.

India—Schapoor Ndhedaar, Bombay; Col. J. Waterhouse, Calcutta.

Australia—W. Barnett, Sydney, N. S. W.

France—Leon Vidal, 10 Cité Rougemont, Paris; E. A. Audra, 3 Rue Logelback, Paris; J. Davanne, 82 Rue des Petits Champs, Paris; Gaston Tissandier, Societé Photographique Francais, Paris; Prof. M. Lippmann, M. Nadar, M. Marey, M. Henry Bros, Dr. Janssen, Paris.

Belgium—Jas. Mans, 59 Rue du Mousin, Brussels; Aug. Lemaire, Boulevard du Hainaut, 94 Brussels; Chas. Puttemans, Brussels; S. Maes, Antwerp; A. De Blochouse, Antwerp; Prof. Devylder, Ghent; Prof. Donney, Ghent.

Germany—M. Karl Schweir, Weimar; Mr. Fredr. Mueller, 9 Amalien Str. Muenchen; Prof. Bruno Meyor, 71 Thuraistrasse, Berlin, N. W.; Dr. Adolf Miethe, Muehlenhausen, 1 Potsdam; Herr Braun, Dornach; Dr. Hermann Vogel, Berlin; Dr. F. Stoltze, Berlin; Dr. Liesegang, Duesseldorf.

Switzerland—Boissonas, Geneva; Dr. G. Gunze, Zuerich; Dr. Barbieri, Prof. Polytechnical Institute, Zuerich; F. Pricam, Geneva.

Austria—Lt. Col. and Imp. Councillor, Ottomar Volkmer, 1 Singorstrasse, Vienna I; Imp. Councillor Dr. Ludwig Schramk, Karmehtorstrasse 7 Vienna II; Prof. Dr. Jos. M. Eder, Schottenfeldorstrasse, 77 Vienna VII; Carl Srna, Vienna; Prof. Jacob Husnik, Prag.

Russia—S. Levitsky. Pantelejemonskaja, 2 St. Petersburg; Constantin, Krzyjanowski, Turhon nor Kalinosoka, Bergamosco, St. Petersburg.

Finland—K. E. Stolberg, Helsingfors.

Holland—H. v. d. Mash Spakler, 4 Westernigplantsoen, Amsterdam; P. Freissinet, Amsterdam.

Denmark—M. Steenbro Bredgade, 20 Copenhagen; Prof. L. Denensen, Nyborg.

Sweden—Albin Roosval, Wallhallawagen, 27 Stockholm; Prof. Dr. N. C. Dunir, Upsala.

Japan—Mr. W. K. Burton, 9 Kago Yashiki, Hongo, Tokio; H. Mizno, Tokio; Sacaicho Itchome, Yokohama.

China—Bostwick, Tienstien.

Italy—Ruffo Antonio duca d'Artalia, Rome; Prof. Cav. Giorgio Roster, Florence.

South America—E. Spencer, Santiago, Chili; M. Chute, Buenos Ayres, Argentine Republic.

Hawaiian Islands—Charles Weatherwax, Honolulu.

OUR ILLUSTRATIONS.

Our Frontispiece.—As an appropriate subject for our July number we present to our readers a mechanical reproduction of a photographic study, made from the cast of Jean Antoine Houdon's life mask, which probably gives a better idea of the appearance of the illustrious original than any of the numerous paintings. This portrait was one of the features of the "Chronological Portraiture" of Washington, shown at the June meeting of the Photographic Society of Philadelphia, and was fully noted last month on page 284 of the AMERICAN JOURNAL OF PHOTOGRAPHY.

Our extra picture illustrates the second paper upon "Early Daguerrotype Days." This reproduction of the first photographic portrait made in the world direct from the original is a subject which will interest every photographer, professional and amateur. The picture is too well authenticated to admit of even the shadow of a doubt, and is a priceless relic to the photographic guild at large.

The Frozen North.—With pleasure we inform our readers that the AMERICAN JOURNAL OF PHOTOGRAPHY has a special representative on the "Peary relief" expedition to the Arctic Seas, which sailed on Monday, June 27th. Our representative is provided with a Kodak and an ample supply of Eastman's transparent films, enough to last throughout the journey to the frozen north. No attempt will be made to develop the exposures (except a few for trial) until the return of the party, or in case an opportunity presents itself the exposed rolls, carefully packed, will be sent on in advance, specimens of which will be placed before our readers at the earliest opportunity.

To remove a photograph, states the *American Bookbinder*, from an old or dirty mount, the surplus of the mount should be cut away; it should be put into a plate of cold water and be allowed to float off. A little warm water will assist in its coming away more easily, but should it not do so, the photograph has probably been mounted with a solution of india-rubber, and in that case, by holding it near the fire, the rubber will soften, and the print may easily be peeled off. Very hot water is likely to set up a reaction if the prints were not well washed by the photographer when first sent out. In mounting photographs, white boards should, as a rule, be avoided, because the color of the boards is more pure than the lights of the photograph, and deadens the effect. A toned or tinted board is more desirable.

The Metric System — What It Is.—The decimal or metric system of weights and measures, now extensively used in France and on the continent of Europe, is founded upon the metre as the unit of measure, which, as we stated the other day, is the ten millionth part of the quarter of the meridian, or of the distance from the equator to the pole. The standard, being an astronomical one, is capable of being established with exact accuracy, and is as fixed as the size of the earth. It is also very nearly, though not quite, represented by the length of the pendulum which will measure seconds of time at Paris, the difference being about one-hundredth of a metre. The length of the metre, measured by our present standard, is about thirty-nine and one-half inches.

The divisions of linear measure are formed from the metre by dividing and multiplying it by ten and multiples of ten. The names are formed by prefixing the Greek and Latin numerals for ten, a hundred, a thousand, etc., to the name of the unit. Latin terms indicate the fraction of the metre, Greek ones the multiples of that measure. Thus we have the decimetre, centimetre, and millimetre, representing respectively the tenth, hundredth and thousandth of a metre, and the decametre, hectometre, kilometre and myriametre, representing measures of ten, a hundred, a thousand, and ten thousand metres.

These measures squared, give the series of surface measures, which are the metre square, the decametre, hectometre, decimetre, centimetre square, etc. The denominations in this series, from smallest to greatest, are of course each one hundred times greater than the other.

The measures of capacity are based on the litre as the unit. The litre is a cubic decimetre, and is, if represented in ordinary terms, of the capacity of about a pint and three gills. The other denominations range by tens, hundreds, and thousands, and are designated by Greek and Latin numeral prefixes, precisely as in the case of linear measures. Thus, we have the decalitre, hectolitre, kilolitre, and the decilitre, centilitre and millilitre.

The unit of weight is the gram, which is the weight in vacuo of a cubic centimetre of distilled water at its greatest density. The denominations are by tens and hundreds, and are similarly designated with those of linear and cubic measure. The kilogram, or weight of a thousand grams, is very nearly equivalent in ordinary weights to two and one-fifth pounds avoirdupois.

These are the most essential peculiarities of the metric system. It is of course designed to be applied to weights and measures of every

kind, and for every purpose, and is subject to other modifications when required; but all these are made in strict harmony with the fundamental principles of the system. Thus, the unit of measure of land is formed from the decametre square, and is called the are. From this are formed the hectare or centimetre square — one hundred ares, and nearly equal to two and one-half English acres — and the centare or metre square, or one hundredth of the are. For great weights we have the metric quintal of one hundred kilograms, and ship's cargoes the metric ton of one thousand kilograms.

Besides the uniformity and fixedness of this system, its great beauty lies in the ease with which the different denominations and standards may be changed into each other simply by decimal multiplication and division, as in decimal numbers or Federal money. Its adoption would at one stroke wipe out from our arithmetics their complicated tables of denominate numbers, and the perplexing and unsatisfactory problems in those branches which are the dread of school-boys and school-girls. It would enable butchers, apothecaries and jewelers to understand each other's weights, and purchasers to know how much they are getting for their money.

The Fad of Autographic Plaques.—The girls have a new fad now. It is called the "autographic plaque." Like all fads it has swept the homes of the young women like wildfire, and has occasioned no end of sharp comments by members of the sterner sex, who have been mulcted of dimes. The "autographic plaque" is an ingenious device of a china-firing concern, and its purpose is financial gain for this establishment. Pieces of card-board, 10 x 10 inches in size, are distributed where they are likely to meet with a favorable reception. These pieces of card contain a circle in the centre,—a reserved space large enough for a reproduced photograph. From the circumference of this circle extend lines to a larger circle, like spokes in a wheel from the hub to the tire. The spaces between these lines are for autographs. There are fifty spaces, and it has been declared the proper thing for a girl to get the autographs of fifty of her male friends written within them. An unwritten law in this fad decrees that each autograph writer must produce a dime with his signature. When all the spaces are full and each name paid for, the girl has five dollars, and this five dollars, if sent to a certain place with the card and a photograph of the owner, will secure a china plaque with the picture and autographs reproduced and fired. It is a great scheme for the girls who have little or nothing to do, and signatures are greatly in demand.

Photographic Hints and Formulæ.

ALUMINIUM BLITZ-PULVER.

Photographie Francaise gives following formulas for the substitution of aluminium for magnesium in flash-light compounds. All are stated to give excellent results provided the aluminium powder is properly pulverized.

Aluminium powder	24 gr.
Chlorate of potassium	60 gr.
Sugar	6 gr.

or

Aluminium powder	30 gr.
Chlorate of potassium	75 gr.
Sulphide of antimony	12 gr.
Saltpetre	15 gr.

For flash lamps:

Aluminium powder	100 gr.
Nitrate of ammonia	5 gr.
Lycopodium	25 gr.

Colored flash lamp mixtures may be obtained as follows:—

Yellow light:

Aluminium	100 gr.
Lycopodium	20 gr.
Nitrate of ammonia	5 gr.
Oxalate of soda	12 gr.

Red light:

Aluminium	100 gr.
Oxalate of strontium	12 gr.
Lycopodium	25 gr.
Nitrate of ammonia	5 gr.

Green light:

Aluminium	100 gr.
Nitrate of ammonia	5 gr.
Lycopodium	20 gr.
Oxalate of barium	10 gr.
Chlorate of barium	2 gr.

Photographic Scissors and Paste.

Lantern Experiments.—Tanks can very easily be made. Take two pieces of glass narrow enough to slide into the lantern front, and about six inches long. For an open front lantern half plates suit admira bly. Place between them a piece of rubber gas tubing, roughly following the outline for three sides, and clip all together with three stout rubber bands, one at each end and one along the bottom. A tank so made is practically watertight, and can be easily cleaned after use and put together again in a minute or two.

The experiments are almost endless. A very pretty one, though scarcely chemical, is to fill the tank with water and focus on the screen; then introduce a few drops of the various aniline or resorcin colors, red, green, mauve, etc. They descend in wavy, branching spirals, and, of course, appear on the screen to ascend, usually suggesting sky rockets. By mingling several colors a very pretty effect is obtained.

Mixtures of a great number of substances, themselves soluble, produce insoluble precipitates, *e. g.*, ferrocyanide of potash and ferrous sulphate, when combined, give rise to Prussian blue. Silver nitrate and potassium bichromate form the deep red silver chromate. For screen work the solutions can hardly be too dilute, as otherwise the precipitates are too opaque. Again, put some water acidulated with sulphuric acid into the tank, and drop in a few fragments of zinc. Multitudes of bubbles of hydrogen are given off, chasing each other across the screen. With a sufficiently strong battery, water can be decomposed into oxygen and hydrogen.

One of the most telling experiments is to make a solution of litmus, with which the tank is filled; projected, it appears a deep blue color. Introduce a little vinegar or other weak acid; it immediately turns red, the effect strongly reminding one of a volcano. A few drops of ammonia or any alkali will replace the blue tinge.

There is nothing new in all this, but perhaps it may be new to one or two of your younger readers. I was myself surprised to find how easily water-tight tanks could be made in the way indicated. They are also well suited for projection of the aquatic larvæ of many insects, water fleas, and similar creatures, and being rather narrow, they can be easily kept in tolerable focus, and squirm about the disk of light in manner most comical.—*Amateur Photographer.*

How Celluloid Films are Made.—Celluloid is comparatively a new product in the arts, and dates back only to about the year 1869. It is a hard, durable substance, almost entirely unaffected by acids and alkalies, unchangeable under ordinary atmospheric conditions, and is very tough. It is rendered plastic by heat, and can be moulded into any desired form. Alcohol and acetic acid act upon it, partially dissolving it. It is soluble in acetate of amyl, forming a useful quick-drying varnish. It is manufactured in a variety of forms. Imitations of tortoise shell, amber, and malachite are produced which defy detection very often. The sheet imitation of ivory is used in photography as a basis for positives. The variety, however, which concerns us mostly now is the transparent kind, which is manufactured in sheets 1-100th of an inch in thickness, and which has a surface like glass. It is as clear, and, like glass, is not affected by moisture, which, of course, is a very great desideratum for our purpose.

The manufacture of celluloid sheets is somewhat as follows: A pile of pure white paper is acted upon by nitric and sulphuric acids, converting it into nitrocellulose. It is washed to free it from the acids, and then treated with wood spirit and camphor, producing a jelly-like block, which is then subjected to great pressure, which is sustained for several weeks. The block, from which most of the spirit is evaporated, is put into a machine something like a planing machine, and is cut into shavings of the thickness of the film required; each shaving or sheet of film, which measures 50 by 20 inches, is hung up to dry for a period of about three months, in order to thoroughly season it and prevent any after-change. Each sheet is then taken and rolled under great pressure between heated metal plates, to obliterate the marks of the cutting knife. If one takes a piece of celluloid and moistens it with alcohol, one can see very distinctly the lines caused by the knife. The metal plates are either polished or grained, according to the surface required, the polished giving the smooth film and the grained the matt surface. Both kinds are used. Some makers of negative films coat the matt film, leaving the matt surface at the back. It is no doubt very good for retouching, but the negatives take longer to print, and also the matt surface is very liable to become scratched. The gelatine emulsion is spread over the sheets by means of special appliances, which produces a film of gelatino-bromide of silver of great uniformity. The emulsion is the same as that used in the preparation of dry plates and the film, when dry, is precisely the same as a glass plate, with the exception that the support is celluloid instead of glass. The great advantage of celluloid films is, of course, the lightness and portability;

a dozen half-plate films weigh about four ounces, while the same number of glass plates will average three pounds, while in thickness one gross of films will occupy four inches and one gross of glass plates about fourteen inches. Another great advantage is that there is no fear of breakage. Halation, too, so common with glass plates, is almost entirely obviated by the use of films.

As many of our leading amateur photographers are also gentlemen farmers, the following hints, culled from our rural exchanges, may prove of interest:

Now is the time to plant soft crabs.

Pepper should be planted in hot weather.

You should always use a soft sponge in washing sheep.

Mosquitoes should be muzzled from February 28 until December 1.

Raisins are best planted in sandy soil. This prevents them from becoming dry.

Never shake your pumpkin trees. Take a ladder and pick them to prevent bruising.

Sweet potatoes, to be well kept during the winter, should be stored in a fire-proof safe.

The best way to smoke hams is to fasten your hogs in the pen and put a match to the building.

A good way to rid potato vines of the Colorado beetle is to catch the bug between the thumb and forefinger and crush it between the teeth.

World's Fair Note.—Helena, Montana, will send to the Exposition a meteor discovered near that city. It is composed of nickel and magnetic iron, and is in two pieces of ninety and seventy pounds respectively. It is reported that when found these pieces were in a hole in the ground large enough to contain a house, from which fact it is inferred that the meteor exploded when it struck the earth.

Arson.—Harry L. Hall, Shenandoah, Va., a photographer, was committed without bail May 23d on a charge of arson.

Frederick Richter, a young photographer, is also in jail as one of the conspirators. Hall left town after instructing Richter to apply a match to a two-inch piece of candle placed on some turpentine-soaked rubbish in his gallery.

Richter told the police, and Hall was arrested in Frackville. The property was insured for $300.

THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.

A STATED meeting of the society was held on Wednesday evening, June 8th, 1892, Mr. Joseph H. Burroughs, president, in the chair.

The Board of Directors reported that at the conversational meeting, May 25th, the prize lantern slides sent to the American Interchange by the English journal, *Photography*, were shown.

Mr. Harrison D. Stratton was elected an active member at the board meeting, June 2d.

The family of the late Mr. William L. Springer have presented to the society a collection of lantern slides made by Mr. Springer.

A communication from Mr. F. C. Beach, editor of the *American Amateur Photographer*, was read, in regard to a petition for the extension of the photographic privilege at the World's Fair in Chicago in 1893.

On motion of Mr. Taylor, the president was authorized to sign the petition representing the two hundred active and life members of the society.

Mr. G. B. Wood exhibited a small camera which a friend of his had brought from Paris. It was of the size and shape of an opera or field glass, and carried 12 plates, size 2⅜x1¾. The lens was of a universal focus, and was contained in one side of the camera. The other side was used as a finder, the exposure being made by an exposing shutter on the lens.

Mr. G. B. Wood also exhibited a very ingenious dark lantern for use when traveling. It contained a reservoir for stearine, so arranged that when the lamp was lighted the heat melted the stearine, which then ran down to the wick. The lantern was small and compact, and could be readily packed for traveling.

Mr. Jennings exhibited a series of lantern and stereoscopic slides of lightning flashes. The stereoscopic pictures, he claimed, were the first ever made of the heaven's electrical discharges, and the stereoscopic effect was decided interesting. In one case the sensitive plate had caught the mystical thunderbolt, from which radiated, in various directions, numerous tongues of flame. The theory of the exhibitor was that thunderbolts were formed by a collison of flashes and a consequent scattering of the discharge into a number of points or balls of flame, which travelled onward into space on their own account.

In another view the stereoscope revealed the fact that a discharge apparently zig-zag in its direction, was usually spiral in its course.

Mr. Brown submitted two negatives for inspection, one of which, a flash-light picture, was disfigured by a wavy ribbon of light across the centre. The other was dotted with small circular spots of white glass. The latter, he believed to be due to the use of a rose nozzle in washing, —a wearing away by the continued action of water, but the former he was utterly at a loss to account for.

Mr. Wood stated that he noticed the other day, on examining certain negatives taken seven or eight years ago, that the film was leaving the plate,—coming off in great flakes. The plates were not frilled when developed, and he thought perhaps the alum bath rendered the film brittle, and gave it a tendency to leave the plate.

Mr. G. M. Taylor said he knew of an instance where the film had left the celluloid altogether,—had peeled off in one piece.

Mr. Young exhibited negatives made by the new Zeiss Anastigmat lens, manufactured by the Bausch & Lomb Co. The lens was 4x5, but Mr. Young tried it on a 6½x8½ plate, with full opening, and it covered the plate well to the margin. The definition, depth of focus and rapidity were remarkable.

Mr. Pancoast showed a panoramic photograph of the city of Waterbury, Conn., which he had taken by means of an adjustable tripod top of his own manufacture. Four 8x10 plates were used, and the pivotal top he had carefully subdivided into four positions, embracing in all 101 degrees. He had a supplementary arrangement with five positions, which would take in 124 degrees. The picture exhibited showed great uniformity, and the continuity was admirable.

At the conclusion of the meeting a series of slides, presented to the society by the family of the late Mr. Springs, formerly a member of the society, were shown upon the screen, together with others contributed by members present for the evening's entertainment.

Adjourned. ROBERT S. REDFIELD, *Secretary.*

World's Fair Note.—Philadelphia's contribution to the Pennsylvania exhibit at the Fair will include a number of articles of great historic interest. Among them are the desk and chairs used in the Continental Congress, and the celebrated portraits of the signers of the Declaration of Independence.

LUMINOUS PAINTS IN ALL COLORS.

A GERMAN contemporary gives the following series of receipts for these paints, which may prove useful. The luminous paints can also be used as wax colors for painting on glass and similar objects, by adding, instead of the varnish, ten per cent. more of Japanese wax and one-fourth the quantity of the latter of olive oil. The wax colors prepared in this way may also be used for painting upon porcelain, and are then carefully burned without access of air. Paintings of this kind can also be treated with water glass. For orange luminous paint, 46 parts varnish are mixed with 17.5 parts prepared barium sulphate, 1 part prepared Indian yellow, 1.5 parts prepared madder lake, and 38 parts luminous calcium sulphide. For yellow luminous paint, 48 parts varnish are mixed with 10 parts barium sulphate, 8 parts barium chromate, and 34 parts luminous calcium sulphide. For green luminous paint, 48 parts varnish are mixed with 10 parts prepared barium sulphate, 8 parts barium chromium oxide green, and 34 parts luminous calcium sulphide. A blue luminous paint is prepared from 42 parts varnish, 10.2 parts prepared barium sulphate, 6.4 parts ultramarine blue, 5.4 parts cobalt blue, and 46 parts luminous calcium sulphide. A violet luminous paint is made from 42 parts varnish, 10.2 parts prepared barium sulphate, 2.8 parts ultramarine violet, 9 parts cobaltous arsenate, and 36 parts luminous calcium sulphide. For gray luminous paint, 45 parts of the varnish are mixed with 6 parts prepared barium sulphate, 6 parts prepared calcium carbonate, 0.5 parts ultramarine blue, 6.5 parts gray zinc sulphide. A yellowish brown luminous paint is obtained from 48 parts varnish, 10 parts precipitated barium sulphate, 8 parts auripigment, and 34 parts luminous calcium sulphide.

Luminous colors for artists are prepared by using pure East India poppy oil in the same quantity instead of the varnish, and taking particular pains to grind the materials as fine as possible. For luminous oil color paints, equal quantities of pure linseed oil are used in place of the varnish. The linseed oil must be cold-pressed and thickened by heat.—*Building World.*

In the Twilight Hour.

WE learn rapidly when our teachers are those we love.

IT is often better to have a great deal of harm happen to one than a little, since a great deal will arouse us to remove what a little will only accustom us to endure.

EVERY day sends to their graves a number of obscure men, who have only remained in obscurity because their timidity has prevented them from making a first effort, and who, if they could have been induced to begin, would in all probability have gone great lengths in the career of fame.

RECKLESS youth makes rueful age.

A MAN should never be ashamed to own he has been in the wrong, which is but saying that he is wiser to-day than he was yesterday.

ASSOCIATE with men of good judgment, for judgment is found in conversation, and we make another man's judgment ours by frequenting his company.

FRIENDSHIP often ends in love, but love in friendship never.

THE supreme happiness of life is the conviction that we are loved.

TO most men experience is like the stern light of a ship, which illuminates only the track it has passed.

HE is unworthy to live who lives only for himself.

A LONG life hath long miseries.

IF rich be not elated; if poor be not dejected.

EVERYBODY knows worse of himself than he knows of other men.

IF you would be known and not know, vegetate in a village; if you would know, though you be not known, live in a city.

IT is with narrow-souled people as with narrow-necked bottles,—the less they have in them, the more noise they make in pouring it out.

HE that fears you present will hate you absent.

THAT best portion of a good man's life, his little nameless, unremembered acts of kindness and love.

WOMEN have more of what is termed good sense than men. They cannot reason wrong, for they do not reason at all. They have fewer pretensions, are less implicated in theories, and judge of objects more from their immediate and involuntary impression on the mind, and therefore more truly and naturally.

THE generous heart should scorn a pleasure which gives others pain.

WHEN a woman fancies herself slighted by the man she loves, the first person who proposes must be a clumsy wooer indeed if he does not carry her away.

CUPID ON THE WATCH.

PROCESS.

ENGRAVED BY
CROSSCUP & WEST ENGRAVING CO.,
911 FILBERT ST., PHILA.

AMERICAN JOURNAL
OF
PHOTOGRAPHY

THOS. H. McCOLLIN, Managing Editor.
JULIUS F. SACHSE, Editor. XANTHUS SMITH, Associate Editor

VOL. XIII. AUGUST, 1892. No. 152.

THE OPTICAL CONSTRUCTION OF THE PHOTO TELE-OBJECTIVE.[1]

TRANSLATED AND PREPARED FOR THE AMERICAN JOURNAL OF PHOTOGRAPHY.

AT a late meeting of the Amateur Photographic Club, in Vienna, Professor Anton M. Haschek exhibited a camera supplied with one of Dr. Adolf Miethe's Photo-Tele-Objectives, giving a practical demonstration of the large image to be obtained with a minimum of camera extension.

On this occasion experiments were made using a protractor as a model. The results demonstrated that at a distance of one meter, with six cm. camera extension, the resultant image on the ground-glass equalled two-thirds the size of the object.

With an ordinary lens, under similar conditions, the image measured but one centimeter.

At the next stated meeting Professor Haschek read a supplemental paper, in which he exemplified the optical construction of the new objective.

Professor Haschek stated that to be able to present a clear conception of its peculiar construction, it was necessary to refer cursorily to the primary principles of the lens-theory as laid down by Gauss.

We will take for this purpose the figure of a cross-section of a scalene bi-convex lens, showing the course of the parallel rays subsequent to their emergence from the lens.

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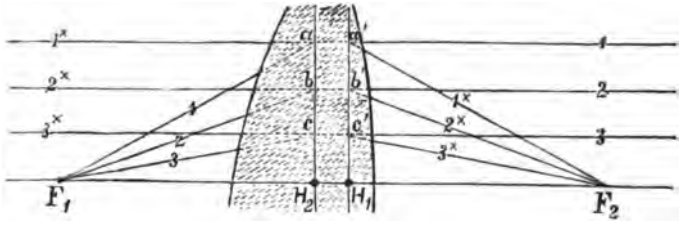

FIG. 1.

We perceive here parallel rays which fall upon the lens from both sides, in direction of their axis. If we follow these rays we find that those denominated 1, 2, 3, after their emergence from the lens are broken in their focal point towards F_1, while rays 1*, 2*, 3* diverge towards F_2.

If we now lengthen the entering and emerging rays up to their diameter, we will find that rays 1, 2, 3 at the points *a*, *b*, *c*, and the rays 1*, 2*, 3*, at the points *a'*, *b'*, *c'*, intersect, and which, as will be seen by the drawing (Fig. 1), both rest upon a plane that intersects the axis of the points H_1 and H_2—a problem which is also capable of being demonstrated mathematically.

If we now resolve the whole proceeding into a problem as represented upon a corporal lens placed perpendicularly upon a level plane, the parallel planes become the principal plane of the lens.

We are now enabled to picture the process of refraction in a convex lens. When a ray parallel to its axis reaches the principal plane of a lens turned towards it, the ray penetrates without diversion, and breaks only when it reaches the next line of the principal plane. A ray becomes reversed when directed from its course toward the nearest principal plane, and parallel to its axis it takes its course through the focal point, and leaves the second principal plane without a change of direction.

You will thus perceive that the action of a lens is fully determined by four points, viz.: The focal points F_1 and F_2, and the principal points H_1 and H_2.

We will now apply this illustration to show the picture construction with a convex and concave lens.

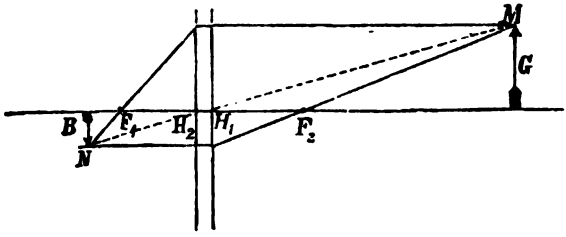

FIG. 2.

We will now take the four points, F_1, H_2, H_1, F_2, which will represent the cardinal points of a convex lens. The perpendicular lines H_1 and H_2 represent the principal planes; "G," an object. To obtain our image, we draw a ray parallel to its axis, so that it penetrates the principal plane at H_1, and is released at H_2, through the focal point F_1. The ray passing through the focal point at F_2, leaves the principal plane H_1 parallel to its axis, the intersection of both rays gives the position of the arrow-point in the picture. A perpendicular line drawn upon the axis designates the image B of the original.

When we connect the point M with H_1 and N with H_2, we find that the ray penetrating H emerges from H_2 in the same direction.

This property is utilized in the construction of a picture by aid of a concave lens.

Assuming once more an existence of the same conditions regarding the principal plane and focal points, the ray parallel to its axis intersects the principal plane H_1, and is refracted at H_2, as if it emerged from F_2. The ray darting towards H_1 leaves H_2 parallel in an equal direction.

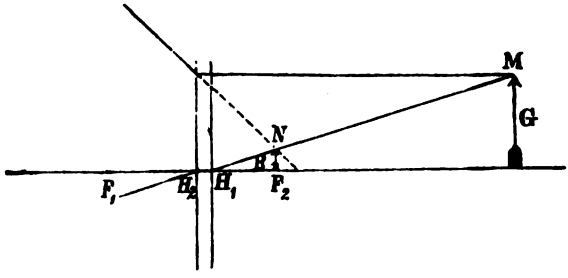

FIG. 3.

The intersection of both rays at N is an image of the point M; the line B perpendicular to the axis is the image of the object G. It will be observed that the intersecting point arises from the extension of the ray emerging from H_2, and that a virtual positive image results, in direct contrast to the convex lens, which gives a reversed image.

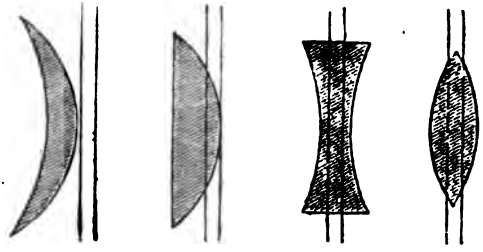

FIG. 4.

It is not requisite that the principal plane of a lens should fall within the body of the lens. By reference to above diagram it will be seen that the position of the principal plane varies with different lenses. Further, that in periscopic lenses the principal plane is actually outside of the lens.

Now, in relation to the new photo-tele-objective. The front combination consists of a convex lens, the back combination of a concave lens. It is requisite that the former combination should be of a greater focal length than the latter. If both lenses are adjusted so that the separation is less than the difference in their focal length, it forms a combination well known to you in the opera-glass. If, however, separated to a distance greater than their focal length, you have the tele-photo-objective.

You can easily judge of its action from the previous description of the lens theory, when you recall that the same conditions which are requisite in locating the principal plane in one lens answer for a system of refracting rays. When we follow a ray falling into the objective parallel to its axis, and intersect it with an emerging ray, we find the principal plane of the objective.

The ray refracted through the convex lens falls upon the

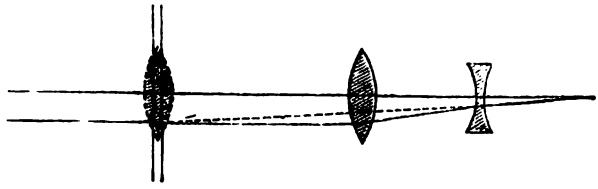

FIG. 5.

concave lens, and in consequence the intersection with its axis is forced to the rear. As may be seen by the diagram, the previously-mentioned intersection, together with the principal plane, is far in front of the objective.

As the distance of the focal point of the principal plane is at the same time the equivalent focal distance of the system, it proves that it is considerably greater than the vertical focal distance of the refracting plane from the local points, and therein consists the action of the combination.

If we substitute for the place of the principal plane a convex lens of the same opening, and of equal focal point and principal plane, the action will explain itself. The illumination and size of image will be equal to this substituted lens.

It is hardly necessary to mention that the new objective is achromatic, and gives a flat picture. The learned professor further stated why the new objective would fail to fill the great expectations claimed for it.

To make an exposure upon an object at a great distance requires not so much an instrument like the one under discussion, but mainly an absolutely clear atmosphere, free from dust. It is this condition which will greatly circumscribe the uses of the new objective in the field for which it was designed. However, there may be other uses for which the combination may be utelized where it will render excellent services, not strictly of a telescopic character.

But, under all circumstances, the combination is a material advancement in modern optics, and the photographic public is greatly indebted to the inventor. JULIUS F. SACHSE.

DISRUPTION OF THE SILVER HALOID MOLECULE BY MECHANICAL FORCE.[1]

BY M. CAREY LEA.

IN a paper published about a year ago on the subject of allotropic silver, there was included an investigation into the action of the different forms of energy upon silver chloride and bromide. It was there shown that these substances possessed an equilibrium so singularly balanced as to be affected by the slightest action of any form of energy. Such action produced a change which, though it might be wholly invisible, yet caused the breaking up of the haloid when subsequently placed in contact with a reducing agent. The forms of energy with which this effect was observed are:

1st. Heat.
2d. Light.
3d. Mechanical force.
4th. Electricity (high tension spark.)
5th. Chemism.

It follows therefore that it is not light only that is capable of producing an invisible image, but that this power belongs alike to all forms of energy. So that a slight impulse from any one of the forces just mentioned brings about a change in the equilibrium of such a nature that the molecule is more easily broken up by a reducing agent.

As respects four out of these five forms of energy, it was further shown that when made to act more strongly, they were able of themselves to disrupt the molecule without external aid. One form alone of energy, mechanical force, made an apparent exception to this general rule. The other four, when applied to a moderate extent, produced a latent image: applied more strongly they broke up the molecule.

The first object of the present paper is to prove that this exception does not exist, and that as all forms of energy have been shown

[1] Read before the National Academy, April, 1892, by George F. Baker.

in the previous papers of this series, to be capable of impressing an invisible image, so also with stronger manifestations, any form of energy is capable of disrupting the molecule.

I was able to show many years ago that mechanical force could produce a latent image. Lines drawn with a glass rod on a sensitive surface could be rendered visible by development in the same way as impressions of light. An embossed card pressed on a sensitive film left an invisible image which could be brought out by a reducing agent. The raised portions of the embossed work exerted a stronger pressure on the sensitive film than the rest of the card, and these portions darkened when acted upon by a reducing agent. In the same way the lines traced with a glass rod blackened under a developer. In each case, it was the portions which had been subjected to pressure which yielded first to the reducer. It was therefore clear that in the molecule which had received this slight pressure the affinities of the atoms had been loosened.

To bring these phenomena fully into line with the others, it is now necessary to prove that an increased pressure can take the place of a reducing agent and disrupt the molecule. And this is actually the case.

It was found that the breaking up could be produced in two ways, by simple pressure, and by shearing stress. Silver chloride and bromide formed and washed in absence of active light were subjected to these agencies.

1. *Simple Pressure.*—In the first trial made with silver chloride, it was enclosed in asbestos paper which had been first ignited with a blast lamp to remove all traces of organic matter present. This method was tried in order that the chloride should be in contact with perfectly inactive material only, but it was not found to answer. The great pressure employed forced the dry chloride into the pores of the paper, cementing it together, so that the opposite sides could not be separated. Platinum foil was then substituted with satisfactory results. With a pressure of about one hundred thousand pounds to the square inch, maintained for twenty-four hours, the chloride was completely blackened except

at the edges, where, owing to greater thinness, the pressure was less. Very bright foil was used in order to detect the slightest discoloration that might occur, but none resulted; it was impossible to distinguish the portions which had been in contact with the darkened chloride from those that had not. The chloride did not assume the usual chocolate color, but changed to a deep greenish black. Silver bromide gave exactly the same results. It should be mentioned that the silver chloride and bromide were each precipitated with an excess of the corresponding acid.

As silver iodide precipitated with excess of potassum iodide is not darkened by light, it seemed improbable that it should be by pressure. The experiment was however tried, and it was found that the iodide darkened fully to the same extent as the others. This result surprised me so much that the experiment was repeated with every possible precaution. The result left no doubt that silver iodide, as well as the chloride and bromide, is blackened by great pressure. All three silver haloids take on the same coloration, an intense greenish black. It was found best to use the material air-dried. If at all moist, the platinum foil bursts under the pressure, and the experiment is invalidated. The air-dried salt retains sufficient quantity of moisture.

2. *Shearing Stress.*—As a means of applying this form of force, the silver chloride precipitated with excess of hydrochloric acid and well washed, was put into a porcelain mortar and well triturated. The improbability that the small quantity of force that can be applied in this way would break up a stable molecule like that of silver chloride seemed so great that at first a substance tending to aid the reaction was added. Tannin was selected, and when forcibly ground up with silver chloride the latter was soon darkened. Next a substance capable of taking up acid, but having no reducing action, was tried. Sodium carbonate was used. This also caused the chloride to darken. Finally it was determined to ascertain if the molecule of silver chloride could not be disrupted by stress alone. The chloride was placed in a chemically clean porcelain mortar and well triturated. For some time no effect was visible. After about ten minutes' action dark

streaks began to appear, and after five minutes' more work a considerable portion of the chloride was darkened. The end of the pestle was covered with a shining purple varnish. It had not become perceptibly warmer to the touch. On the violet purple substance nitric acid had no action, but aqua regia slowly whitened it. It was therefore what I have proposed to call silver photo-chloride, that is, a molecule combination of chloride and hemichloride. This experiment was carefully repeated with the same result. Silver bromide similarly treated gave a similar result. It was noticed that both chloride and bromide in darkening took on the familiar color between chocolate and purple, so generally seen in the darkening of these silver salts, and differing strikingly from the greenish black color assumed by all three silver haloids under simple pressure.

The fact that the platinum foil remained absolutely unattached when the silver haloid was reduced by simple pressure in actual contact with it, is interesting, and would seem to show that in the reduction of the silver haloid the halogen is not at any time set free, but that water, if present, is decomposed at the same moment with formation of halogen acid.

The observations recorded in this paper prove the existence of perfect uniformity in the action of all kinds of energy on the silver haloids. The balance of the molecule is at once affected by the influence of any form of energy. A slight application produces an effect which, though invisible to the eye, is instantly made evident by the application of a reducing agent. The bonds which unite the atoms have evidently been in some way loosened so that these molecule break up more easily than those to which energy has not been applied. Consequently, if the substance is submitted to the action of light, heat, or electricity, or if lines are drawn by a glass rod (shearing stress), or with sulphuric acid, chemism, a reducing agent, blackens the parts so treated before it affects the parts not so treated. This justifies the statement made earlier in this paper that the phenomena of the latent image and of its development are not exclusively, or even especially,

connected with light, as heretofore supposed, but belong to all other forms of energy as well.

It is therefore true that every form of energy is not only capable of producing an invisible image,—that is, of loosening the bonds which unite the atoms, but is also capable, if applied more strongly, of totally disrupting the molecule. This law, in a general form, was proved in other papers, with but a single exception, and that one exception is removed by the observations recorded in this paper.

As far as observations have gone silver compounds are the only ones that exhibit this universal sensitiveness. Of other substances, some are decomposed by heat, some by electricity or by chemical action, and a few by light.

It has been shown, as I believe for the first time, that mechanical force is competent without the aid of heat to break up a molecule that owes its existence to an exothermic re-action.

It is important to distinguish between the two treatments here described. In the case of shearing stress, force is expended in overcoming friction, and in so doing produces heat. It may be questioned, however, whether the very small amount of heat thus generated has anything to do with the re-action. The heat is not perceptible—it is momentary, and it has been elsewhere shown that though moist silver chloride can be broken up by heat, the action is slow even at a temperature of 100° C.

In the case of simple pressure heat certainly plays no part. The material is small in quantity, is folded up in metal, is placed between large and heavy pieces of metal, and the pressure is applied gradually by means of a screw. Even supposing a slight increase of temperature, it could not exceed one or two degrees, and would be momentary. As just remarked, heat does not produce an effect except at about 100° C. and after many hours.

The powerful affinity which exists between silver and the halogens is well known. That this affinity can be counteracted and annulled by simple pressure, that the halogen can in part be forced out of the molecule by mechanical means unaided by heat, is remarkable.

It need scarcely be said that this phenomenon has nothing in common with decompositions produced by mechanical force in substances such as silver or mercury fulminate, nitrogen chloride and similar explosives. Such substances are all formed by endothermic re-actions, and their decompositions are exothermic.

Heat does not need to be supplied, but only what Berthelot has named a "travial préliminaire,"—an impulse to start the re-action.[2]

But silver haloids are formed by exothermic re-action, consequently their decompositions are endothermic, and require that the energy which was disengaged in their formation should be returned to effect their decomposition. The experiments described in this paper show that mechanical force may be made to supply this energy, and so play the part of light, electricity or heat without previous conversion into any other form of energy.

The thermo chemical re-actions of the silver haloids have been studied by Berthelot, and their reductions were found to be endothermic. There can be no doubt therefore that an endothermic re-action can be brought about by simple pressure.

New Field for Models.—The most curious occupation heard of lately, is that of a young woman who earns bread and butter by being photographed. It has been a business, occupying a small number of women in Paris regularly, for some years back, to pose for sketch artists or before the camera for the composition of the fashion plates sent out with the more expensive French fashion magazines. Nothing of the sort has been done in New York until lately, when a demand sprang up for fashion plates which looked life-like and not wooden, and the utmost difficulty has been experienced in getting a better class of art work in them. Women with pretty faces are beginning to be appealed to to lend their features and their figures for the purpose.

[2] Mecanique chimique, vol. 2, p. 411. The reduction of silver chloride to metal involves an absorption of Cal. 29.4. That to hemichloride has not been measured, but is, according to Berthelot, also endothermic. See also, Ditte, Les Metaux, 1, pp. 232, 233.

A PLEA FOR THE HAND CAMERA.

XANTHUS SMITH.

HAVING noticed in some articles published lately by writers about cameras and photographing, a disposition to speak disparagingly of hand cameras, as detective cameras are now often called, and of hand camera work, we would feel disposed to say a word or two in their favor.

The idea which these writers would seem to wish to convey is, that any work which is done in photography other than with a camera well secured upon a tripod is mere trifling, and altogether beneath the attention of the would-be artistic photographer,—who, they would lead you to suppose, is invariably to give so much concern to the selection of his subject, and the focusing and exposure, that any apparatus which does not admit of being screwed to a table-like support must be considered entirely inadequate to the production of valuable photographic pictures. The going about with a trifling little box, though it may appear formidable in its complexity of screws and registers, dials and triggers, and snapping away at whatever presents itself to you as curious, it is mooted by some, is employment suited only to the half-witted enthusiast or the school boy, and should be frowned down by the legitimate photographer, who sets his art above such light accomplishments as sporting with a hand camera.

Now let us look at this subject of hand camera work from a different point of view, perhaps more impartially, and with a more progressive state of mind, and see whether the hand camera does not deserve a better standing alongside of its old tripod parent,—whether it must necessarily hang its head as an impostor in the presence of the good old legitimist who is useless without his three legs, and whether the man—or woman either—who sports the hand camera must take a back seat amongst the profession.

First, let us remark that we approve of the incoming term *hand camera*, because in its progression and perfection this sort of camera is in many instances developing out of the purely

detective instrument, which it was held within the confines of in its earlier forms. The departure from the concealment of its purpose, by enabling the use of a lens better adapted for making agreeable pictures, for instance, we consider a great stroke in its favor.

We have now to look at a number of considerations which must be taken into account in fixing the degree of importance which should be given to hand camera work.

The improvement, as we have said, of opening the front of the hand camera, and introducing a long bellows which may be racked out, thus admitting of the use of a long focus lens, completely does away with the great objection to which the first detective cameras were open, of extreme wideness of angle of the objective and consequent distortion. Now the individual who handles the hand camera may eschew such subjects as are not at a sufficient distance to form agreeable pictures, and confine himself, should he be so inclined, to purely artistic effects.

Then the superior lens, with the extremely rapid plates now at our command, give us together an amount of detail in instantaneous exposures which does away with the old objection of under-exposure in shutter work. Indeed, we have been astonished lately with views taken with hand cameras provided only with single lenses. So fully was the detail brought out in the shadows, and so ample was the work in half-tones, that nothing more could be desired, and we can safely say that had the camera been secured upon a tripod and a time exposure given, the resulting pictures would not have been better. Of course the subjects were open landscape and water scenes.

We would not be understood as advocating the use of the hand camera for professional work, which must generally be upon a much larger scale than that of most amateurs, nor for any of the legitimate uses of the ordinary camera mounted upon a tripod, but one of the most extensive branches of photography now, and one that is daily on the increase, is that of the tourist, and what a zest has it not given to the enjoyment of hundreds of individuals who go upon their summer or winter excursions as

the case may be, to be able to secure momentos of whatever may appear beautiful or interesting to them for future reference, and to convey at a glance to their friends what the most prolonged description could not have made intelligible.

Many years ago, in the old wet-plate days, and when amateur photographers were about as scarce as dry plates were in those days, the writer was making a painted study from nature in a glen renowned for its scenic attractions. He was come upon suddenly by a most venerable-looking clergyman, accompanied by a party of ladies. Pausing as he passed, the man of good work said to the painter, "Ah, you are the fortunate man, for you not only enjoy all the beauties here set before us, but you carry them away with you." Now who may not carry away with them the beauties which they encounter upon such occasions? Think of the capabilities of the little box, but a few inches square, hung over the shoulder by straps. What youth or delicate lady or old man could feel incumbered by it? And in it they may carry away,—we had almost said hundreds,—but truly dozens upon dozens of charming views, quaint groups, or grotesque subjects for future intellectual enjoyment.

It must be remembered that if a great many persons who are lacking either in good taste or in some art culture, and who use detective or hand cameras, take innumerable inartistic and indeed often very absurd pictures, it is not the means that is to be blamed, but the individual instead. With a fair amount of training in the proper direction, and good judgment, we will venture to say that far more may be done with a hand camera in the way of securing excellent pictures than with the most elaborate pains bestowed with set-up camera where good taste is wanting. We have only to bear in mind that there are certain limitations to all photographic work, certain boundaries, which, if we go beyond, we will be violating good taste and good judgment, and that a hand camera even does not license us to go beyond these.

One circumstance greatly in the favor of the use of a hand camera is that it may be used on the instant. How often does it not happen that we have presented to us for a few moments

some rare combination in the way of grouping or effect, especially in subjects comprising figures and animals, which if we could secure them within a minute or so we might have the pleasure of adding to our albums, whereas if we must needs unpack and set up, we can only say at the outset that the attempt is useless, and again, we are led to attempt exposures which we would not make under other conditions, and thereby may secure such combinations and effects as give the greatest variety and zest to our collections.

It must be admitted, though, in connection with hand camera work, that in order to attain satisfactory results a considerable amount of previous practice with the camera or tripod would be of advantage in improving the judgment in selection of view and lighting, because the operator must determine sometimes on the instant what will make a satisfactory picture and what will not, and a few points should always be kept uppermost in the mind. There should not be too great a prevalence of shadow in the subject. In the case of landscape or street scenes, if attempted on bright sunny days with a clear sky, if we look too much toward the sun it will be almost impossible to prevent an overwhelming amount of strong shadow unrelieved by detail, which will be rendered still less agreeable by the narrow, harsh cutting lights.

A very important point in hand camera work is that we see that we are not carried away by our subject. That is,—always remember that the beckground and surroundings of that which strikes you as highly suited to your fancy, will be just as prominent, nay frequently ten times more so, in the photograph as that for which you are aiming, and will ten to one so overwhelm what you sought as to render it worthless. A very large percentage of the work which we see done with hand cameras is ruined by the prevalence of busy spots of light and dark in incidental objects which are entirely irrelevant to the subject of the picture, and when it is seen beforehand that such will be the case, the exposure had better not be made.

Of course in many instances it is very difficult, in fact, often impossible, to tell just what will be the very nick of time to make

the exposure, and here the element of luck comes in. It does not do to be too cautious, or you may continually be losing the best chance in hesitating for a better one, and, on the other hand, if you are too ready about your exposures your plates or films will have been expended before the best is arrived at. Of course individual circumstances will govern a good deal in this matter. With those persons who are so fortunate as to possess both ample time and means, we would say fire away,—do not miss a chance that would seem likely to result in an interesting picture, and subsequently destroy those negatives which are undesirable. The less favored will have to be more wary, and rather take the risk of losing a picture than waste their material.

In conclusion, let us advise all who may to secure a good hand camera, one of the improved sort with ample lens capacity, and we will ensure that if they limit their work within the bounds of good taste, in the selection of subjects, they will derive much gratification from the pursuit, and will surely accord the hand camera the place which it deserves as a very important auxiliary to the photographic art.

The Purity of Platinic Chloride.—In Krauch's work on the testing of reagents for their purity, the only requirements prescribed for platinic chloride are that it should be completely soluable in absolute alcohol, and that when ignited the residue should yield nothing soluble to dilute nitric acid. A. F. Holleman now reports (in *Chem. Zeitung*, 1892, No. 3) that he has met with a platinic chloride, obtained from one of the best-reputed manufacturers, which responded to the above tests, but was found, when used for the quantitative determination of potassium, to yield such discrepant results that some other impurity was suspected to be present. On close investigation it was found to contain sulphuric acid.

To Photograph the President.—C. M. Gilbert, the photographer, has been asked to photograph President Harrison at the White House.

EARLY DAGUERREOTYPE DAYS.—III.

AN HISTORICAL RETROSPECT.

BY JULIUS F. SACHSE.

(*Continued from page 315.*)

THE APPLICATION OF BROMINE.

THE successful demonstration of Daguerre's process by Joseph Saxton, together with the subsequent experiments by Robert Cornelius, excited a widespread interest in the scientific circles of Philadelphia. Among the scientists who thus became interested in the new process was Dr. Paul Beck Goddard, assistant to the professor of chemistry in the University of Pennsylvania, who then resided, or had an office on the east side of Ninth Street, opposite the University.

Dr. Goddard at once opened communication with Mr. Cornelius, examining the apparatus, and investigating carefully the manipulations as practiced thus far by the latter. These visits ended by a duplicate apparatus being made for the use of Dr. Goddard, who entered into a series of chemical experiments, in which it is stated that he had the assistance of the celebrated chemist, Professor Robert Hare.

It will be noted that thus far all the results shown by Saxton and Cornelius had been obtained by the use of dry iodine as a coating for the plates.

In the previous chapter it has been stated that the first two portraits ever made by the daguerreotype process, were made by Cornelius,—the first of himself, the other of his children, which is also still in existence. The honor of making the third portrait belongs to Dr. Goddard. This was also made in the open air in the rear of his residence on Ninth Street, by the use of dry iodine. The subject or sitter was a student in the medical department of the University,—Aaron D. Chaloner. An interesting account of this sitting was given the writer by an old physician still living, who was present on this occasion, fifty-three years ago, while a student at the University of Pennsylvania.

The subject, Chaloner, was seated upon a chair in the bright sunlight, with the injunction not to move, but he became restless before even the preliminary operations, such as focussing, were completed. Dr. Goddard, fearing that the attempt might result in failure, obtained from Dr. Hare's laboratory in the University opposite, a blue reflector of some kind, and after the focusing was completed, a blue reflection was thrown upon Chaloner by an assistant, in such a manner as to neutralize the direct rays of the sun. The exposure, it is stated, was prolonged to about three minutes, and resulted in a fair picture.

The investigations and chemical experiments of Dr. Goddard were mainly confined to chlorine, bromine, and iodine, and he was not long in discovering that bromine combined with iodine on the plate would reduce the time of exposure from one-third to one-half within doors* while in his yard, in the open air, the impression was almost instantaneous. These experiments resulted in the production of a perfect specimen by the use of bromine, in December 1839, which was subsequently shown at the American Philosophical Society (Proc., Vol. III., p. 180).

This is the first record of the employment of bromine in the photographic process. It was during this series of experiments with bromine that Dr. Goddard succeeded in obtaining several good views and portraits instantaneously in the open air, which were the *first instantaneous pictures made by any heliographic process in the world.*

The application and use of bromine as an accelerator was kept a close secret by Goddard and Cornelius, for about two years. It was this use of bromine, together with Cornelius' superior skill in polishing his plates, which account for the great beauty of his early daguerreotype miniatures. There is still in existence a plate,[1] unfortunately in a very dilapidated condition, which it is claimed was one of Goddard's earliest bromide efforts. It represents two male figures in a negligé attitude, one leaning back in a chair, the other against a fence. The picture was without a doubt made in the open air.

* The laboratory of Dr. Goddard was lighted by a skylight.

[1] Now in possession of the writer.

It has been stated to the writer by several old persons who knew Dr. Goddard well at that time, that for a short time he also made for pay daguerreotype miniatures at his residence in Ninth Street. His appointment as demonstrator of anatomy in the University of Pennsylvania in the year 1841, diverted his attention from professional portraiture. He, however, did not relax his interest in the new art.

In the latter part of the year 1841 a young man, an assistant to Cornelius, was approached and tampered with by parties from New York, who had opened a daguerreotype gallery there. This individual succumbed to the temptation of the offers made to him, and secretly left Cornelius and worked for two weeks in New York, divulging the whole secret of the use of bromine as an accelerator. As soon as this fact became known, Dr. Goddard at once published the discovery, and the process became public property, and soon came into general use. At a subsequent stated meeting of the American Philosophical Society, held January 21, 1842, Dr. Goddard presented specimens of photographic portraits made by the diffused light of a room, and by the peculiar process in which bibromide of ioidine is used. This process he described, and stated that he had ascertained only on that day, that a similar method had been presented to the French Academy, which, however, in some particulars, was inferior to his own. (Proc. Am. Philo. Soc., Vol. II., 144.) On the fourth of March following Dr. Goddard exhibited, before the same society, specimens of daguerreotypes on a surface of gilded silver, and stated that the surface of iodide of gold was more susceptible to the daguerreotype action of light than that of the iodide of silver, that the surface of the plate might be polished without injury before the action of the iodine, and that the lights came out better than on the silver surface. (Proc. A. P. S., Vol. II., p. 150).

In English and Continental text books upon photography, the claim for priority in the use of bromine as an accelerating agent is usually accorded to one John Goddard, a London optician. That this is clearly an error is apparent from the above indisputable record. The honor for the first use of bromine as a sure and valuable accelerator, and the subsequent application to daguerreotype

and photography, without a shadow of a doubt belongs to Dr. Paul Beck Goddard, of Philadelphia.

Dr. Paul Beck Goddard, from photograph by F. Gutekunst, Philadelphia.

Paul Beck Goddard, a native of Philadelphia, was born in the year 1809, graduated in the medical department of the University of Pennsylvania in 1832, appointed demonstrator of Anatomy for the same institution in 1841, a position which he resigned in 1847, when called to the chair of Anatomy of Franklin Medical College, which he filled until 1852. In 1847 he was appointed Surgeon to the First City Troop—Philadelphia's crack military organization. From 1859 to '63, Dr. Goddard was connected with the Philadelphia Board of Health, from 1863 to 1865 he served as Surgeon in the U. S. Volunteer Service. He died July 5th, 1866.

It is further a a noteworthy fact that while Philadelphia scientists labored to shorten the time of exposure by chemical means, confining themselves exclusively to the daguerrean apparatus, which time has proven to be the only practical method, experimenters in New York attempted to achieve the same object by the use of mechanical inventions and such chimerical apparatus as a reflecting camera and other equally impracticable devices, which were all abandoned as soon as Goddard's Philadelphia process had been surreptitiously obtained.

The First Snapshot.

Among early experimenters in heliography whose names should not be forgotten, is that of Dr. Joseph E. Parker, who lived number 61 North 7th Street, then a fashionable quarter of the city. Dr. Parker was a dentist by profession, an active mem-

ber of the Franklin Institute, and one of the first experimenters to use the Daguerre process for out-door views, street scenes, etc. He was also one of the pioneers in micro-photography. It is more than probable that Dr. Parker was let into the secret of the use of bromine at an early day, as it would have been impossible to obtain the instantaneous views by the use of dry iodine.

A heliograph (daguerreotype) upon a silvered plate 6x5 inches made by Dr. Parker in the month of March, 1840, is now in possession of the Historical Society of Pennsylvania. It represents Race street wharf at the Delaware, and after the lapse of more than half a century, is still (except where mechanically injured) in a perfect condition, and in definition equal to many of the amateur efforts of the present day.

A series of these views by Dr. Parker were exhibited in the "Department of Fine Arts" at the Franklin Institution exhibition held during October, 1840. These specimens naturally attracted much attention, and were greatly admired for their beauty and fidelity to nature. The only question which arose to their detriment was the as yet unknown factor of permanency. The committee on premiums awarded Dr. Parker a *certificate* of *honorable mention* for his exhibit.

How long Dr. Parker remained a disciple of the daguerrean art the writer has been unable to determine, nor does there seem to be any record of any specimens from him at any subsequent exhibitions.

ARTIFICIAL LIGHT.

The first picture ever taken by artificial light, of which there exists any definite record, was made towards the end of the year 1839, by William G. Mason, a resident of Philadelphia. Mason, was a well known engraver, whose establishment for many years was located at No. 46 Chestnut street (now 204), above Second street. At an early date he became interested in the Daguerre process, and being proficient in polishing silver plate, soon obtained some fine specimens of heliography. It was while pursuing these experiments with his crude apparatus and hap-hazard chemicals, that he succeeded in making a perfect copy of an

engraving, by artificial light, the source of illumination being a small gas burner, and the time of exposure about one hour. This was probably the first heliograph ever taken without the aid of direct sunlight.

Some of these efforts of Mason's were still in existence during the Centennial year (1876), and it was always the opinion of old daguerreotypists that Mason's success depended entirely upon his skill in obtaining an exceedingly high polish upon the silver plates which he used in his experiments. The writer has been unable to discover the whereabouts of any of these specimens at the present day.

Among the earliest pioners in the photographic field there is one whose name must not be forgotten, viz.; Edward Tilghman, Esq., who, for over half a century, has continuously kept an interest in photography in all of its various phases, from Daguerre's crude process to Ives composite heliochromy of the present day. This veteran amateur, a member of the *Photographic Society* of *Philadelphia*, was in Europe when the first notice of the process was published; returning shortly afterwards to his native country, he at once obtained an outfit and took up heliography. For plates he rolled out silver quarter and half-dollar coins; these were then polished, coated, and exposed in the camera and used for portraiture. A specimen portrait made by Mr. Tilghman about 1840 is at present in posession of the writer.

Mr. Tilghman was probably the first amateur photographer who made portraiture a study.

Attempts at Portraiture Elsewhere.

Before passing the subject of early experimental portraiture, it will be well to leave Philadelphia for a short time and take a survey of the photographic field at large;—at home as well as abroad.

It must be borne in mind that at the period of Daguerre's discovery, there were, as yet, none of the present rapid modes of inter-communication,—no telegraph, telephone, nor ocean cables,

([2] Vide History of Heliographic Art, pp. 355.)

to flash the news of a new discovery around the globe in seconds of time.

The Associated Press, with its army of correspondents and interviewing reporters were, as yet, uuknown, while a daily mail service, with ocean Greyhounds, was undreamed of. All intercourse was by private correspondence and depended upon the primative mail service afforded by the stage coach and ocean packet. Thus it was that results achieved at distant places were weeks and months in becoming generally known.

Although the problem of heliographic portraiture had been practically solved in Philadelphia within two months after publication of the process in America, it is not to be supposed that no efforts were made elsewhere to utilize the Daguerrean process for portraiture, notwithstanding the fact that Daguerre personally had but little hope for the application of his process to portraiture from life, on account of the length of time requisite for the exposure.

In America the names of Professor J. W. Draper and Samuel F. B. Morse, of New York, are prominently associated with the subject of early portraiture. Friends of both having repeatedly claimed that to their particular champion belongs the honor of having been the first to apply Daguerre's process to portraiture.

Prof. Draper had occupied himself with investigating the chemical effects of light, almost ten years before any one in America had turned attention to the subject. The deductions were published in the *Journal* of the *Franklin Institute*, several years prior to the publication of Daguerre's process. Shortly after the latter was published in America, Professor Draper had constructed an apparatus, according to directions, with a common spectacle glass, of fourteen inches focus, arranged at the end of a Segar box, as a camera.[1] This lens was found to answer for plates 3x4 inches. With this crude apparatus Prof. Draper made numerous attempts at heliographic experiments.

After numerous failures and disappointments,[2] he succeeded in obtaining several views of buildings, and other objects, from

[1] London, Edinburg, and Dublin Philosophical Magazine, Vol. XVII., p 220.

[2] Root, p. 341.

his laboratory windows, which were somewhat similar to Saxton's earliest efforts.

It was sometime during the next year (1840) that Prof. Draper attempted the application to portraiture. For this purpose he had constructed a camera with a lense five inches in diameter and seven inches focus. When all preparations were completed, the victim, after having his face well powdered over with flour to make it look like a plaster cast, was placed in the bright sunlight, the back of the camera was pushed back to the violet focus, after which the sitter was subjected to the torture of a fifteen minute exposure.[3] The result was an impression which showed such parts as the forehead,[4] cheeks, and chin, upon which the light fell most favorably. Another attempt, in which the time was greatly prolonged, produced an outline of the whole conntenance. Upon this experiment seems to be based Dr. Draper's clai.n for priority in photographic portraiture. Diligent inquiry has failed to locate any of Draper's early specimens, or settle the date of this experiment with any degree of certainty, but there is no doubt that it was made at least three months after Cornelius' portrait was shown at the meeting of the Philosophical Society in Philadelphia.

Crude as was this attempt at heliographic portraiture, it was thought of enough importance to herald abroad as an application of Daguerre's process to portraiture.[5]

Prof. Morse, the inventor of the Magnetic Telegraph, was also a pioneer in daguerreotypy. When Daguerre first announced his discovery, in 1838, Morse was in Paris, for the purpose of showing his Electro-Magnetic Telegraph. Daguerre then kept his process a close secret; even the results were carefully guarded, and then had been shown only to the King and a few distinguished Savans. By advice of M. Arago, Daguerre refused to show them to other persons during the pendent action of the French Chambers.

(*To be Continued.*)

[3] Schiedel Geschichte, p 43, W. Jerome Harrison states half an hour, p. 26.

[4] Root, p. 341.

[5] London *Journal of Science* June, 1840.

ELEMENTARY THEORY OF THE EQUIVALENT FOCUS II.

BY PROF. HENRY CREW, LICK OBSERVATORY.

REFRACTION THROUGH LENSES.

Being now in a shape to treat spherical surfaces in general, let us consider the image I′ (fig. 3) as an *object*, producing a second image by refraction through a second spherical surface. We shall then have the case of the single lens.

Following Seidel's notation, R_4 will be the radius of this second surface.

The case in which the refractive index of the *third* medium is the same as that of the *first* will include nearly every case met with in practical photography.* We shall, therefore, call the refractive indices of these two media, unity.

In fig. 4, let S_2 and S_4 be two refracting surfaces whose optical axes coincide: f_4 and f'_4 the first and second principal foci of the second refracting surface; a'' and b'' the images of a' and b' after refraction at S_4: the other symbols have the same meaning as before; since the optical axes of the two *surfaces* coincide, the line aa' will be the optical axis of the *system*.

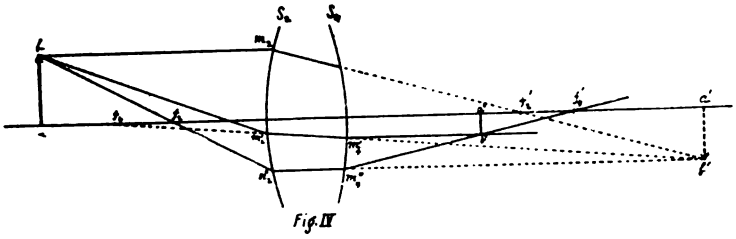

FIG. 4. Illustrating refraction at two spherical surfaces.

The manner in which the object ab gives rise to the image $a'b'$ we have just seen.

Consider now $a'b'$ as the luminous object.

The ray m''_2b', being parallel to the optical axis, will after refraction at S_4 pass through f'_4. Join b' and f_4. The intersection of this line with the surfaces S_2 and S_4 will determine the points m'_2 and m'_4. This ray ($m'_2\,m'_4$) will, of course, coincide with the ray bm'_2 after refraction

*The human eye furnishes a case in which the first and third media are quite different.

at S_2, and will after refraction at S_4 be parallel to the optical axis. The point of its intersection with $m''_4 f'_4$ will be b'', the image of b'. In like manner, each point on the line $a'b'$ will have its conjugate point on the line $a''b''$.

The line $a''b''$ is therefore the image of ab produced by the lens.

Geometrical Determination of the Focus.—The second focus of the lens will be the point where a ray, leaving the object, parallel to the optical axis, intersects the optical axis after two refractions.

To find this point, we have in fig. 5 only to join m_4 with b''.

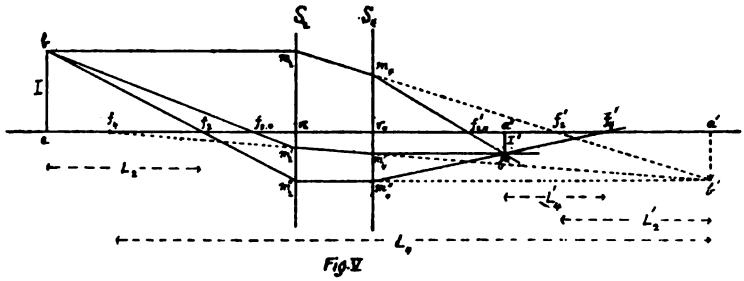

FIG. 5. Illustrating the geometrical determination of the principal foci of a lens.

Its point of intersection with the axis, $f_{2,4}$, will be the *second* principal focus of the lens.

To determine the first principal focus, join b with m'_2. This ray emerges, after two refractions, parallel to the optical axis. The point of intersection with the axis, $f_{2,4}$, is therefore the *first* principal focus of the lens.

If our geometrical ideas are now clear, we are ready to derive a practical formula in which we may substitute the numerical values of the radii of curvature and refractive index, and thus *compute* the position of the foci from the "constants" of the lens.

For the surface S_2, we have
by Eq. 14, $L_2 L'_2 = F_2 F'_2$
For the surface S_4, we have
$L_4 L'_4 = F_4 F'_4$

where
$$\begin{cases} L_2 = -a f_2 \\ L'_2 = +a' f'_2 \\ L_4 = +a' f_4 \\ L'_4 = -a'' f'_4 \end{cases}$$

since (Eq. 11),

$$F'_2 = -\mu F_2$$
$$F_4 = -\mu F'_4$$

it follows that

$$F'_2 F'_4 = F_2 F_4 \quad \ldots\ldots\ldots\ldots\ldots \text{Eq. 16.}$$

Definition of D.—Let us call D the distance *from* f'_2 *to* f_4; positive, of course, when measured to the right; negative when measured to the left, as in the figure.

Then

$$D = L'_2 - L_4 = \frac{F_2 F'_2}{L_2} - \frac{F_4 F'_4}{L'_4} \quad \ldots\ldots \text{Eq. 17.}$$

Since L_2 and L'_4 determine conjugate points of the system, we have only to make these two distances respectively equal to infinity to determine the positions of the second and first principal foci of the lens,

When

$$L_2 = -\infty$$

$$\text{We have } [L'_4 =] \; -\frac{F_4 F'_4}{D} = F'_{2,4} \text{ (say) Eq. 18.}$$

When

$$L'_4 = \infty$$

$$\text{We have } [L_2 =] \; \frac{F_2 F'_2}{D} = F_{2,4} \text{ (say) . . E. 19.}$$

Since these quantities $F_{2,4}$ and $F'_{2,4}$ are special values of L_2 and L'_4, they obey the same rule of signs and are measured from the same origins, viz., f_2 and f'_4.

As will be seen, these focal distances are numerically equal only when the radii of curvature of the two surfaces are equal.

Employing Eqs. 18 and 19, we may write Eq. 17 in the following form:

$$\frac{F_{2,4}}{L_2} + \frac{F'_{2,4}}{L'_4} = 1 \quad \ldots\ldots\ldots\ldots \text{Eq. 20}$$

Let us still further simplify Eq. 20 by calling the distance of the object from the first principal focus, $K_{2,4}$: and the distance of the image from the second principal focus, $K'_{2,4}$.

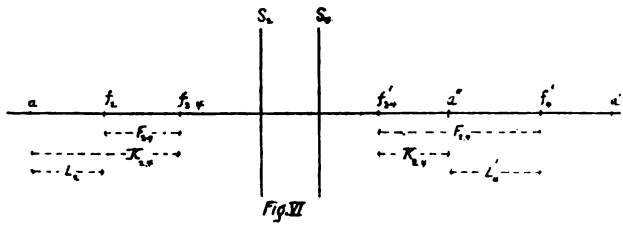

FIG 6.—Illustrating Newton's Rule for lenses.

Then (Fig. 6)

$$K_{2,4} = L_{2,4} - F_{2,4}$$

and

$$K'_{2,4} = L'_{2,4} - F'_{2,4}$$

Eq. 20 now assumes the form

$$\frac{F_{2,4}}{K_{2,4} + F_{2,4}} + \frac{F'_{2,4}}{K'_{2,4} + F'_{2,4}}$$

or

$$K_{2,4}\, K'_{2,4} = F_{2,4}\, F'_{2,4} = -\frac{F_2\, F'_2\, F_4\, F'_4}{D^2} \quad \ldots \text{Eq. 21.}$$

This is the most elegant form in which one can express the relation between the positions of conjugate points, and shows that "Newton's Rule" applies to lenses as well as to single surfaces.

Dimensions of the Image produced by a Lens.—Having found the *position* of the image we now proceed to determine its *size.*

From similar triangles in fig. 5, it will be seen at once that

$$\frac{I}{K_{2,4}} = \frac{v_2\, m'_2}{v_2 f_{0,4}} = \frac{v_2\, m'_2}{F_2 + F_{2,4}}$$

$$\frac{-I''}{F_4} = \frac{v_2\, m'_2}{v_2 f_2} = \frac{v_2\, m'_2}{D + F'_2}$$

Eliminating $v_2\, m'_2$, we have

$$\frac{I''}{I} = -\frac{F_4\,(F_2 + F_{2,4})}{K_{2,4}(D + F'_2)}$$

$$= -\frac{F_4 F_2 \left(1 + \frac{F'_2}{D}\right)}{K_{2,4}\,(D + F'_2)}$$

$$\frac{I''}{I} = -\frac{F_4\, F_2}{K_{2,4}\, D} = +\frac{K'_{2,4}\, D}{F'_2\, F'_4} \quad \ldots\ldots \text{Eq. 22.}$$

$$I'' = K'_{2,4} \times \textit{Constant} \quad \ldots\ldots\ldots\ldots \text{Eq. 23.}$$

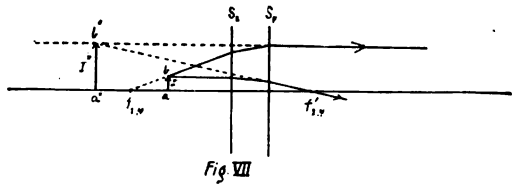

FIG. 7.—Showing how the size of the image depends upon the position of the object.

Definition of Principal Planes.—Considering still the same lens which we have been discussing, imagine the object $a\ b$ to approach along the optical axis from an infinite distance to the left, *i. e.*, imagine $K_{2,4}$ to increase from $-\infty$ to 0. It is evident from Eq. 21 that $K'_{2,4}$ will at the same time increase from 0 to $+\infty$.

As a passes $f_{2,4}$ (the case represented in fig. 7), $K_{2,4}$ changes sign: so, therefore, also does $K'_{2,4}$, since the right hand member of Eq. 21 is a constant, for any given lens.

From Eq. 22 it will be seen that when

$$K'_{2,4} = \infty$$

the image is infinite in size, and that, as $K'_{2,4}$ passes through infinity, the sign of the image is changed. If before it was erect, it is now inverted: if before inverted, as in the ordinary double convex lens, it is now erect. The image, it will be observed, always lies in the angle $b'f'_{2,4}a'$. This is equally true whether the lens be a convergent or divergent one.

Let the object $a\ b$ proceed still further to the right. The erect image will approach the object in size. Finally a point will be reached where the image has the *same size* as the object and is *erect.*

The plane now occupied by the object is known as the *first principal plane;* the plane occupied by the image is the *second principal plane.*

The *principal planes* of a lens may, therefore, be defined as the two planes which, if an object be placed in one of them, there will be formed in the other an *erect* image of the *same size* as the object.

These must be carefully distinguished from the two *symmetric planes,* an object placed in one of which gives rise to an *inverted* image of the *same size* in the other.

The points in which the principal planes intersect the optical axis are known as the *principal points* of the lens.

These, together with the *principal foci,* constitute the four *cardinal* points, or, as they they are sometimes called, after the man who discovered their properties, *Gaussian* points of the lens.

It is difficult to overestimate the value of Gauss's method of treating lenses. As will be seen in the sequel, it secures for the combinations actually used in practice all the simplicity and accuracy which belong to the hypothetical infinitely thin lens of the text-books.

Positions of Principal Planes.—To determine the positions of these planes, we have

$$\frac{I''}{I} = +1 \quad \ldots\ldots\ldots\ldots \quad \text{Eq. 24.}$$

which gives us (Eq. 22)

$$[K_{2,4} =] \; - \frac{F_2 F_4}{D} = -F \text{ (say)} \quad . \; . \; . \; . \text{ Eq. 25.}$$

$$[K'_{2,4} =] \; + \frac{F'_2 F'_4}{D} = -F' \text{ (say)} \quad . \; . \; . \; . \text{ Eq. 26.}$$

But $K_{2,4}$ and $K'_{2,4}$ are the respective distances of the object and image from the first and second principal foci; so that F and F′ are the respective distances of the first and second principal foci from the first and second principal points. Since, Eq. 16,

$$F_2 F_4 = F'_2 F'_4,$$

it will be seen that

$$F = -F'.$$

The *first* principal *plane* is, therefore, at the same distance from the *first* principal *focus* at which the *second* principal *plane* is from the *second* principal *focus*.

The distance from either principal plane to its corresponding principal focus is what is known in photography as the "*equivalent focus*" of the lens; this same quantity is called in physics "*the true focal length.*"

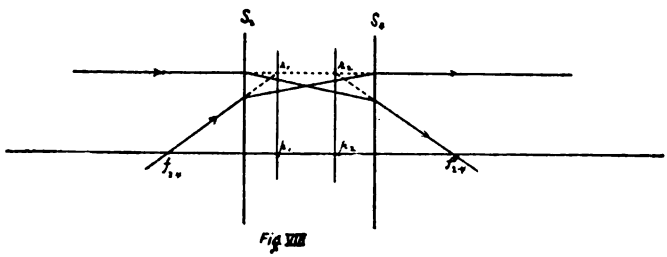

FIG. 8.—Showing the principal planes as planes of unit magnification.

It is quite evident geometrically, from Fig. 8, that if *r* be a radiant point, satisfying the condition expressed in Eq. 21, and giving rise to the two rays, *b r*, parallel to the optical axis, and $f_{2,4}$ *r*, through the first principal focus, that these rays, after refraction, will intersect at the point r_2. So that the image of the line *r*, *p*, is, as we have proven above analytically, $r_2 p_2$, an erect image of the same dimensions.

As will be seen later, these planes for double convex lenses lie between the two bounding surfaces S_2 and S_4. In many of the most interesting lenses used in photography and astronomy they lie quite outside the substance of the lens.

The reason for measuring equivalent foci from these planes is that it introduces greater simplification into all the formulæ for magnifying powers and conjugate points. This will appear from what follows:

Introducing the values of F and F′ (Eqs. 25 and 26) into Eq. 21, we have

$$K_{2,4}\, K'_{2,4} = F\,F' = -F^2 = -F'^2 \quad . \; . \; . \; . \text{ Eq. 27.}$$

while Eq. 22 becomes

$$\frac{I''}{I} = \frac{-F}{K_{2,4}} = \frac{K'_{2,4}}{-F'} = \sqrt{\frac{-K'_{2,4}}{K_{2,4}}} \quad . \; . \text{ Eq. 28.}$$

Let us now measure all distances either from the first or second principal planes. We have

$$F = +\frac{F_2 F_4}{D} \quad . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \text{ Eq. 25.}$$

$$F' = -\frac{F'_2 F'_4}{D} \quad . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \text{ Eq. 26.}$$

$$U = K_{2,4} + F$$
$$U' = K'_{2,4} + F'$$

The two fundamental Eqs. 27 and 28, now become

$$\frac{F}{U} + \frac{F'}{U} = +1 \quad . \; . \; . \; . \; . \; . \; . \; . \; . \; . \text{ Eq. 29}$$

and

$$\frac{I\,F}{U} + \frac{I'\,F'}{U} = 0 \quad . \; . \; . \; . \; . \; . \; . \; . \; . \text{ Eq. 30}$$

Or, since $F = -F'$

$$\frac{I'}{I} = \frac{U}{U}$$

These expressions are identical in form with the corresponding ones, (13) and (15,) for a single refracting surface. And herein lies the great beauty of this method, viz., that one can compute the magnification of a lens and the position of the ground glass from the simple expressions employed for a single surface. This, too, with no approximation for the centre of the field. That Eq. 29 is *not* true for all parts of the field will be evident when one considers the blurring of the image given by a single glass or a single achromatic near the edges of the ground glass when the centre is sharp. That Eq. 30 does not hold for all parts is shown in the *distortion* which one finds near the edges of the ground glass, even when the definition is sharp.

(*To be continued.*)

LIPPMANN'S COLOR (?) PROCESS.

THE following communication to the *London Times* appeared in the issue of that paper for Thursday, July 7th, 1892. It is probably the best and most unbiased account of the Lippmann process which has thus far appeared in the secular press. A careful perusal will show that the opinion given by the various photographic periodicals was a correct one, in which it was stated that the process as published was of no practical importance in solving the color process, and that the whole matter was merely a resurrection of a long-discarded German experiment.

The writer who is a well known English authority in the photographic world, needs no introduction to the American student in photography:

Sir :—The public has been so often deceived by the announcement of the discovery of "photography in natural colors" by a direct process, that it ought to be suspicious of such periodic announcements, and ask for some impartial testimony as to the correctness of the alleged discoverer's statements.

Professor Lippmann's name has been in every one's mouth; the papers—scientific and otherwise—have recently reported the complete success of his process of reproducing photographically the true colors of nature.

We have read that within the last two months Professor Lippmann submitted to the French Academy of Sciences color photographs, not only of the spectrum, but of various colored objects; and it is claimed that the color reproduction is perfect, all that is now required being to make the plates more sensitive, so as to shorten the time of exposure in the camera.

I had the opportunity a few days ago of carefully examining the above-mentioned color photographs in the photographic exhibition now open in the Champ de Mars, Paris.

People who were fortunate enaugh to see the really wonderful results obtained by another kind of color photography, recently exhibited before learned societies in London, will no doubt be interested in a careful description of Professor Lippmann's results as they appeared to me; and I would suggest that others interested in the subject should also examine and report upon them.

The exhibit comprises six photographs on glass plates, not seen by transparency, but by reflection, as were the old-fashioned daguerreotypes; three are of the spectrum, one of four pieces of colored glass (described as "a stained glass window"), one of a branch of holly, and one of a stuffed parrot.

None of the subjects photographed are shown for comparison, although the three latter might easily have been placed in the case with the photographs.

The photograph of the "stained glass" is about 1½ in. in diameter; the pieces of glass in it are described as yellow, green, blue, and red.

In the first place, there are no colors visible until the eye reaches a certain angle with respect to thc surface of the plate, and by slightly changing the angle of vision the colors also change.

Seen by light reflected at a small angle, that part of the photograph which represents yellow glass is a peculiar spotty mixture of red and yellow; the green glass, a kind of yellow; the blue is blue and the red has a carmine hue.

Seen by light reflected at an angle of 45 deg., the yellow glass is seen as a dull green; the green as bright green; the blue as blue; the red as golden orange. In the photograph of a bunch of holly some of the leaves are a blue green, and others have a golden hue; the berries are orange, with the high lights on them represented as black spots. Not only does white photograph as black, but where there should be black it is absent altogether.

The photograph of the parrot shows it as perched on what appears from its shape to be a photographer's iron head-rest, the rods of which have come out blue in some parts, shading into red on others, with no true shadows, but with black high lights.

The parrot has a fuzzy appearance, and shows the same rendering of white as black, and the absence of true shadows. The colors on the parrot are the same as those on the iron head-rest, and where the tail of the parrot and the vertical column of the head-rest are parallel, the coloring is alike, both shading off from blue above to red below.

The best spectrum photograph exhibited is about 2½ in. long, and shows red, orange, yellow, green, blue, and violet in their proper order, but with nothing to indicate that the respective colours occupy the same position as the similarly colored rays in the spectrum which will produce them; the regularity in the order of the colors is no more than may be seen in color displays on the surface of stagnant pools The color is relatively dull in the orange red, and beyond the visible spectrum at both ends is an expanse of gray.

In one of the spectrum photographs the red is reproduced as a sort of magenta running into blue and green, at the end where the red light of the spectrum is the deepest and purest.

So far, therefore, as evidence is afforded by the examples I have described, it is apparent that the problem of direct photography in natural colours is not solved. I am, Sir, yours faithfully,

Bromley, Kent, Eng. CAMERON SWAN.

A GALLERY IN SAFFRON.

UNDER the National Act of May 5th, 1892, the collectors of Internal Revenue will soon proceed to make a nice collection of photographs of all the Chinese gentlemen that wash clothes, play fan-tan, or engage in other laborious pursuits within their districts. In this district a room in the Post-Office will be set aside for the camera, and the army of long-cued will forthwith stand up and "be took."

This interesting departure in the line of photography is made necessary by the Chinese Exclusion Act, full regulations for the enforcement of which have just issued from the office of Secretary Foster, of the Treasury Department.

According to this act every Chinese man, woman, or child that does labor within the United States must apply for registration in the district wherein he lives before May 5th, 1892. If caught hereafter without the necessary paper he may be made to sail the seas home again to the land of flowers and firecrackers.

The regulations prescribe that the Collectors of Internal Revenue shall receive applications at their own offices from such Chinese as are conveniently located thereto, and will cause their deputies to proceed to the towns or cities in their respective divisions where any considerable number of Chinese are residing, to receive applications. Due notice is required to be given Chinese through posters conspicuously displayed in the Chinese quarters of the various localities, or through leading Chinese, that will be sufficient to apprise all Chinese residing in their districts of their readiness to receive applications, and the time and place where they may be made.

Form No. 1 provides that the Chinaman shall give his age on

last birthday, present local residence, occupation, and state that he was lawfully within the limits of the United States on May 1st, 1892. He is required to sign his name to the application in English, if he can; if not, in Chinese characters, the Collector writing the English equivalent under the signature. Upon the application must be affixed an accurate unmounted photographic likeness of the applicant, which photograph will be securely attached to the application by adhesive paste. The Chinaman is also required to furnish two other photographs of himself, which are to be kept in the files of the Collector's office. If the Collector has any doubt as to the correctness of the photograph presented he may refuse to receive the application, and require a correct photograph. No tintype or any other sun picture will be received as a photograph.

Accompanying the application of the Chinaman is the affidavit of witnesses (Form No. 2). Two witnesses are required to this affidavit, and they must swear that they have known the Chinaman whose application for a certificate of residence is set forth, and that of their knowledge he was within the limits of the United States on May 5th, 1892, and that the photograph affixed is a correct likeness. If the applicant is unable to furnish such witnesses, the Collector may reject his application and refer the matter of issuing a certificate of residence to the Chinese applicant to the Commissioner of Internal Revenue for his decision.

Form No. 3, the certificate of residence issued to the Chinese laborer, sets forth that the Chinaman has complied with the requirements of Forms Nos. 1 and 2, and that he is "lawfully entitled to remain in the United States." This form is to be signed by the Collector of Internal Revenue of the district, and to have attached to it a correct photograph of the applicant to whom it is issued. On the stub to the form it is required to be stated: Name, age, local residence, occupation, height, color of eyes, complexion, and physical marks of peculiarity for identification.

After signing the certificate, and before issue, the Collector must affix his official seal thereto in such a manner that part of the seal impression must be made upon the photograph, and in addition thereto he is required to write across the photograph in red ink the number of the certificate and the name of the Chinese person.

A "CORNER" IN MEDALS.

BY WALTER D. WELFORD.

FOR what purpose do our present photographic societies exist? The probable replies to such a question would be most varied in character, but principally consisting of negatives. They are not for this or not for that. If, too, such a term is permissible, the negatives would be most positive ones. It is so easy to criticise and advise what not to do. No help, however, would be afforded by taking the "objects and aims" of societies as set forth in print upon the prospectus, or in the collection of rules and regulations. All that can be said about these is, that they start the prospectus or rules in a business-like way.

Glance through a bundle of them, and it will be found that they run upon the following general lines:

To further the art science of photography.

To encourage and promote the practice of photography amongst the members.

To promote the best interests of photography.

Even were they much more explicit it would not add to our knowledge as to why the society exists. They are merely preliminary flourishes, figurative expressions of sentiment. The point the practical man desires to arrive at is, whether the society is really attempting to carry out its avowed objects and aims. Certainly, this is to a large extent a matter of individual opinion, and yet I venture to assert that but few societies make much serious effort at anything beyond their own advantage. As, however, it is not my present intention to deal with the matter as a whole, but to tackle one of the negatives,—one of the things a society should not do,—the foregoing must be considered merely a preliminary flourish of my own to this article.

We have heard much in the past as to the "medal craze," and in the multiplication of awards, prizes, certificates, medals, etc., the ordinary every-day society plays a prominent part. As our American friends would put it, some of our society exhibitions and competitions, are "corners" in medals. Most of the awards are

foregone conclusions, or gifts for certain members. If, however, that only took place now and then, it would not matter so much, but where a profusion of awards are offered year after year, and are carried off by the same men each time, I consider the society a nice, quiet, comfortable corner, from which to extract annually a sweet little collection of medals and prizes.

Whether competitions are advantageous to societies or otherwise, I shall not deal with them, but when these competitions are held time after time, probably organized by the actual winners, with the result of merely increasing the award stock of three or four members, then I confidently assert that they are not for the benefit of the society generally, but for the aggrandisement of a few. Curiously enough, too, these few are generally officials to whom is due the continuance of the competitions. They organize and carry out the whole business, including the awards.

To illustrate the matter, I have carefully gone over the last three exhibitions of a large society, from which to deduce figures proving the case, but at the same time shall endeavor as far as possible to avoid giving any clue as to identity. It is, however, announced to have a membership of 200, and so is one of importance, as societies go. Commencing with the total number of exhibitors, the average for three years comes out at 39, which does not show any enormous enthusiasm upon the part of the general body of members. Now, taking the awards made, and not counting certificates or honorable mentions, the list is as follows: —

Officials		Ordinary Members.	
Mr. A. - -	8	1st year - -	4
Mr. B. - -	5	2d " - -	4
Mr. D. - -	5	3d " - -	6
Mr. G. - -	4		
Mr. C. - -	3		
Mr. E. - -	3		
Mr. S. - -	3		
Mr. M. - -	3		
Less than 3 -	6		
Total, - -	40	Total, - -	14

So that for the total three years the officials take forty prizes as against the ordinary members' fourteen. Or, to put it in a more detailed table:

	Officials.	Ordinary Members.
1st year	12	4
2d „	14	4
3d „	14	6

We therefore arrive at this, that in a society 200 strong 39 members only exhibit each year, and out of the medals awarded, 18 go to officials, and 4½ to ordinary members each time.

I trust none of my readers deem me hinting at any unfairness in the judging, for that is very far from my purpose. Moreover, it is not the point I wish to emphasize. What I say is, that as these officials regularly win the greater part of the awards, is it a tribute to their appreciation of the society's object "to advance the art science of photography?" Certainly not. It proves conclusively that in continuing their competitions, the officers are simply feathering their own nests. They practically organize their exhibitions with the full knowledge that they will gain certain prizes.

It is a tribute to their ability for advancing the cause of that prominent personage, "number one," no more, no less.

The question is, are such competitions beneficial to the society, or are they merely nice quiet "corners" in medals?—*The Photographic Review of Reviews.*

Hypnotism.—"Hybnodism," the German professor said thoughtfully, "vos a mendal disorder dot vos raging principally in der noose-papers. It vas hypertrophy auf der imachination, undt der writer on mendal phleenomens vos first attacked. You might call ut a sort auf writer's cramp auf der prain. Der ingrediences been made auf a fool undt a rascal. Mix thoroughly undt set avay in a cool blace.

"It's bedder you enchoy dis pecoollar phleenomens vhile she is goin', pycause she vill soon go down der stream auf time pehind der plue glass, der roller-skate, Koch's lymph, Keeley's gold cure undt pig-headed canes."—*Life.*

MACHINE-MADE EGGS.

YANKEE ENTERPRISE.

ARTIFICIAL eggs were invented some years ago by an ingenious Yankee, and were long merely a curiosity. At first they were too expensive for general consumption, but recent improvements in their manufacture have reduced their cost, so that they now come within the reach of the masses. A new egg factory in New Jersey, which started after the McKinley bill was passed, announces that it is now in full running operation, and will soon be ready to turn out 10,000 dozen artificial eggs a week. It will furnish the eggs, fresh from the factory, for 8 cents a dozen, with 5 per cent. off for cash. All eggs whose shells are broken will be taken back and mended.

This low price for first-class, fresh-laid, prime factory New Jersey eggs will enable the retail dealers in New York to sell them for 10c. a dozen during Easter. Yet some people think that the McKinley bill has made prices higher. See how it lowered the price of eggs! Before the McKinley bill was passed there was no egg factory in New Jersey, and now it contains one of the largest and finest egg factories in the world. A beautiful town is growing up around the egg factory! The factory eggs made in New Jersey are said to be superior to any eggs laid by the hens of pauper-labor countries, like England, Germany, France, China, and Japan. And anyone who eats them has the satisfaction of knowing that he is eating American eggs. The best of New Jersey experts say there is no difference between artificial eggs and hens' eggs. Oleomargarine is chemically the same as butter; American factory eggs are chemically the same as hens' eggs. Indeed, a dozen factory eggs were set under a hen in Hoboken, and a dozen of the most beautiful and chipper artificial chickens were hatched out. It is said, though it has not been verified, that under the wing of each was stamped "American chicken."

The secret of making artificial eggs is closely guarded in the New Jersey factory. All the ingredients are compounded by chemists in a laboratory. It is known that lime is used to make shells, while albumen, phosphate, and sulphur are employed in manufacturing the contents of the eggs. When the eggs come out of the work-room the egg-shells are rough. They are polished by machinery.

In eggs which are intended to be used for photographic purposes, in the production of albumen paper, the use of sulphur is carefully guarded against, and it is confidently claimed by the manufacturers that photo-

graphs upon paper coated with machine egg-albumen will be absolutely permanent.

A lady in Newark, to indulge in a little merriment, wore a string of the superfine egg-shells around her neck at a recent surprise party. Everybody thought they were East India pearls of marvellous size and trancendent value. They were grealy surprised when the lady told them that the ornaments they had so much admired were merely egg-shells so artistically made that they had the lustre of pearls.

The factory eggs may be fried or scrambled. They are excellent either boiled or in omelets. They are said to make better egg-nog than either Western or Southern eggs. A delicate flavor may be imparted to them by various extracts, so that the purchaser may have eggs flavored with vanilla, with lemon, strawberry or pineapple. They may be made every size, from that of a bantam egg to that of an ostrich egg. Many of the New Jersey poultry farmers are up in arms against the new industry. They declare that it will drive the old-fashioned New Jersey hens' eggs out of the market and ruin the chicken industry.

MAGNITUDE OF MOLECULES AND LIGHT WAVES.

WHEN we hear that the successive vibrations in a light ray of average wave length number about 600 million of millions in a second, the natural impression is that they must be submicroscopic in dimensions.

This, however, is from being the case. The actual length of the waves in such a ray is about $\frac{1}{50000}$ of an inch. The parallel rulings on glass plates known as Nobert's test plates, which are employed to test the defining powers of lenses, have been not only "resolved" but photographed when only $\frac{1}{150000}$ of an inch apart (*i. e.*, 150,000 to the inch). In other words, four such lines, spaced as in these rulings, could be drawn within the length of an average wave of light. This shows that the size of the ultimate particles or molecules of the glass must be very much smaller than the waves of light, since several furrows may be ploughed through them within the width of an average wave.

All these magnitudes are, however, far beyond our direct perception or powers of realizing, but we may at least get at some

sense of our shortcomings in power of conception from the following:

A maker of these "test plates," named Webb, many years ago made for the Army Medical Museum at Washington a specimen of microscopic writing on glass. This writing consists of the words of the Lord's Prayer, and occupies a rectangular space measuring $\frac{1}{244}$ by $\frac{1}{441}$ of an inch, or an area of $\frac{1}{129654}$ of a square inch.

The lines of this writing are about as broad as those on the test plates, which are $\frac{1}{50000}$ of an inch apart. They are, therefore, about as wide as average light waves. Now, then, to get some idea of the magnitude or minuteness of this writing.

There are in the Lord's Prayer 227 letters, and if, as here, this number occupies the 129654 of an inch, there would be room in an entire square inch for 29,431,458 such letters similarly spaced.

Now, the entire Bible, Old and New Testaments, contains but 3,566,480 letters, and there would, therefore, be room enough to write *the entire Bible eight times over on one square inch of glass*, in the same manner as the words of the Lord's Prayer have been written on this specimen.

Such a statement, without doubt, staggers the imagination, but the figures are easily verified and are certainly correct, and the whole statement at least serves to bring home to us the limited nature of our mental capacities as compared with the facts of the universe.

It also furnishes an interesting suggestion in a very different subject.

It has been often stated that a physical basis of memory may exist in permanent structural modifications of the brain matter constituting the surface of the furrows. In a highly developed brain this surface amounts to 340 square inches, and it would, therefore, appear that the entire memories of a lifetime might be written out in the English language on such a surface, in characters capably of mechanical execution, such as those of the Webb plate at Washington. See the *Lens*, December, 1873, p. 225 (Chicago). Also Trans. of Micro. Soc. (London), 1862, iii., vol. x., p. 69.—PRESIDENT MORTON, in the *Stevens Indicator*.

THE SWEET GIRL GRADUATE.

The leading photographers of the city were thrown into a whirl of pleasurable excitement by the invasion of the studios by the sweet girl graduates of the Normal School, who, after graduating in a blaze of glory at the Academy of Music, departed in large numbers to have their pictures taken. They were taken in large groups, medium sized groups, quarters, trios, pairs, and singly, and the camera sharps were almost worked to death in their efforts to do justice to the visions of loveliness which they were called upon to perpetuate upon prepared paper. A favorite pose with those taken alone was the "Look-aloft-or-keep-your-eye-on-the-bright-star-of-success" pose, so popular with the sweet girl graduates when making their addresses, although many preferred the queen-like pose combined with the steadfast outward gaze popularly known as the "Let-us-face-life's-trials-and duties-like-true-women-and-bravely-smile-in-the-mocking-face-of-adversity." This latter pose is a more difficult one to make a success of, photographically speaking, and the sweet girl graduate attempting it has to be a daisy to score a bull's-eye. After the exercises the lovely maidens came swarming out into the sunshine from the stage door, like so many white butterflies, and hastened away in carriages and afoot to keep their appointments with the photographers, and many who had not taken Old Grandpapa Time by his bang and arranged for their sittings in advance had either to wait a long time for their turn or to go from place to place until they found a photographer unemployed. And so one week hence or thereabout many a best young man will be made proud and happy with the counterfeit presentation of the maiden he adores.

Journalistic Amenities.—*The Pacific Coast Photographer* in the current number for June pays its respects in rather a vigorous manner to the editorial department of the *St. Louis Photographer*. "Our occidental brother certainly wields an aggressive quill. Personalities of this kind do not tend to elevate the standard of journalism, and are best avoided. However, as the case stands, it is now the *Fitzgibbon-Clark* innings, and it will behoove our California brother to '*Look Sharp*.'"

PROF. S. W. BURNHAM, the well-known astronomer, has resigned his position at Lick Observatory. He has achieved special fame as the discoverer of double stars. It is reported he will go East to accept the clerkship of the Federal Court in Chicago.

Photographic Scissors and Paste.

A Vulgar Outrage.—No one can read of the suit for an injunction to restrain the use of a little girl's photograph by a business house for advertising purposes, without wondering of what kind of material the responsible defendants in the case could be composed.

The suit was brought by the child's parents. One would think that ordinary decency would have prompted the firm making use of the picture, at once, to remove it from its advertising cards, and humbly to apologize for the offence it had committed. It is difficult to imagine a reputable business firm, taking without leave, the portrait of any private person, and spreading it abroad on the cards that advertise its wares. Still more difficult is it to imagine such a firm contending against an action to restrain it from violating the feelings of the father and mother of the child, whose portrait has been seized upon for indiscriminate distribution and vulgar show.

If business houses with such proclivities exist, there ought to be a law for the protection of modest private citizens against them. The man who insists on hanging up in groceries and barrooms, the highly colored counterpart of any photograph he may procure by borrowing, buying, or stealing, ought to be liable to a severe penalty.—*New York World.*

The *Optician* states that: Many eye troubles arise from the present style of books as printed for reading. The pages and columns are too wide, so that the eye cannot take in the whole of them in the range of one focus, but has to strain itself to pass from the beginning of each line to the end. The only way to avoid such a strain is to turn the head from side to side—a movement which is often seen to be practised by short-sighted people in reading wide columns. The width of a column or page of reading matter ought not to exceed, at most, two inches, as this is about the natural range of the eye when the head is kept motionless. With regard to the size, shape, and form of the type used, everyone knows, of course, that, as a general rule, the smaller the type the worse it is for the eyes; and therefore, it can be believed that the tiny edition of Dante produced at the French Exhibition, is said to have blinded two or three at least of the persons engaged in printing and correcting the sheets, but the shape of the type is of great importance to those who wish to preserve their sight. The

worst types of all are those which may be described as tall and thin (the French Elzevir founts). The round, fat-faced types are in every respect to be preferred, not only because the eye runs on more easily over them, but because there is besides less risk of confusing one line with another.

Flash-Light Power.—Captain I. K. Bingham, United States military attaché at Berlin, has recently brought to the attention of the Light-house Board an important discovery in flash lights, the invention of Professor Schevin, of Berlin. The apparatus is only two metres high by thirty-five centimetres in diameter. On the inside is a bellows through which benzine gas is passed, while air is forced through pumice stone strongly impregnated with benzine. This benzine gas is then passed through very finely powdered magnesium and saturated therewith; thence it passes out of an upright pipe through a small flame, by which it is lighted, and here it develops a luminosity of 400,000 candles. The activity of the apparatus is regulated by clockwork.

Economy is an important feature of the new invention, but its greatest advantage is its ability to penetrate an almost opaque atmosphere to a greater extent than any other light heretofore produced. With the use of ten centigrammes of the magnesium powder, it is shown by the official documents presented by Captain Bingham, that a flash of 400,000 candle power can be produced, and the flash can be seen on a clear, sunshiny day at a distance of six miles. The Light-house officials are so well impressed with the new light that they have already ordered an apparatus to be used in experiments at Staten Island. They have also brought the matter to the attention of the Chief Signal Officer, who will inquire into its merits for military signaling. The navy officials will also take it up.

Panoramic Lantern Slides.—At the Conservatoire des Arts et Metiers, Commandant Moessard lectured on panoramic photography, and showed his audience the effects of panoramic perspective on the screen. The latter was semi-cylindrical, eight metres wide and two-and-a-half metres high, the linen being stretched on a frame having the shape of a part of a cylinder of six metres radius. At a point corresponding with the centre of an imaginary circle, of which the screen formed a part, were placed four lanterns, each projecting a portion of a panorama. The most difficult part of the operation was to join the four views exactly, so as to make a continuous panorama; but this was overcome by each view showing at its edges a part of the next

view, to a width of two or three millimetres, the views being marked so as to make them coincide at the proper places, the illumination of the junctions being levelled up to that of the remainder of the picture, by screens in front and at the sides of the lime.—*Ex.*

Kodakers Want a Chance.—A petition has been freely circulated, both in this city and through the country, lately, which has been extensively signed. It is in favor of opening the ground of the Columbus Exposition at Chicago, to amateurs who wish to take photographic snaps at the buildings and exhibits. The Ways and Means Committee has already awarded the privilege to certain photographers, and the petition, besides protesting, sets forth that as ample a revenue will accrue if private fees are charged.

Life of the Commuter.—As many of our respected amateur photographers live "out on the road," the following bit of humor clipped from the *Pittsburg Dispatch* will not be out of place at the present time: The commuter is an enigma. He is just on the verge of happiness, always—not quite there. In the city a man may have a good night out. The commuter is to have his good time to-morrow. He looks forward to the day when something is booked to occur whereon to build his own happiness. "When they run that fast express—" "If they put on that new boat—" "Should the weather be fine next week—" "We'er to have another train on next month—" "Next year you won't know the place—" "We'll have a finer garden after awhile—" etc. The poor, trustful soul! And all this time his friends in the city are getting strawberries and everything else in the vegetable and fruit line months before the commuter has dropped canned goods. The inward satisfaction of knowing that you can get the best crabs, fish, beefsteak, or anything just around the corner that can be had in the world the commuter never enjoys. The possibilities of French or Italian table d'hote when you feel inclined for such society he dare not dream of. The suggestion of a clam cocktail is painful to him. At the idea of an hour or so in a German summer garden he at once buries his face in a time-table. Yet in another month you will see him around in all the bravery of his red shoes, woolen shirt and gaudy blazer, making believe very much that he is living an hilarious suburban life. Poor fellow!

In the Twilight Hour.

THE mere lapse of years is not life.

SOFT WORDS are hard arguments.

HAPPINESS cannot be bought by the bottle.

MAXIMS are the condensed good sense of nations.

NONE BUT a wise man can employ leisure well.

ONE HOUR'S sleep before midnight is worth two after.

HE THAT contemneth small things shall fall little by little.

AROUND me is darkness, but beyond there is light.—*Milton.*

THE GOAL of yesterday will be the starting point of tomorrow.

IT IS the men who want goods on credit that are overwhelmed in the end.

WHAT we know is little; what we do not know is immense.—*La Place.*

CONSCIENCE is a sleeping giant, but his starts are terrible when he awakes.

THE PROSPEROUS man who yields him up to temptation, bids farewell to welfare.

GREAT NAMES degrade instead of elevating those who know not how to sustain them.

SENTIMENTS of friendship which flow from the heart cannot be frozen by adversity.

MANNERS are of more importance than 'aws; upon them, in a great measure, the aws depend.—*Burke.*

THERE are but three classes of men the retrograde, the stationary, and the progressive.—*Lavater.*

KNOWLEDGE, truth, love, beauty, goodness, faith, alone can give vitality to the mechanism of our existence.

UNWISE WORDS, thoughtlessly spoken and then forgotten by a wife, often lead to the ruin of her husband and family.

HE is happy whose circumstances suit his temper; but he is more excellent who can suit his temper to any circumstance.

WHAT makes people so discontented with their own lot in life is the mistaken ideas they form of the happy lot of others.

TRUE HAPPINESS does not exist in any exhilaration, excitement, or ownership, but comes from the use of the faculties of body and mind.

THE EYES of other people are the eyes that ruin us. If all but myself were blind, I should neither want a fine house nor fine furniture.—*Franklin.*

I HAVE been as a child by the seashore, gathering here a shell, there a pebble; whilst the great ocean of truth lay unexplored before me.—*Newton.*

THE MAN who wants the best things, and is willing to pay just what they are worth, by honest effort and self-denial, will have no difficulty in getting what he wants at last.

THREE-FOURTHS of the difficulties and miseries of men come from the fact that most want wealth without earning it, fame without deserving it, popularity without temperance, respect without virtue, and happiness without holiness.

Literary and Business Notes.

PHOTOGRAPHY, by A. Brothers, F.R. A.S. London, Charles Griffin & Co., 1892; Philadelphia, J. B. Lippincott Co. A volume of 365 pages, large 8vo, with 24 full-page plates, and many wood-cuts in the text. This work is a complete manual of photography, giving its history, processes, apparatus, and materials, comprising working details of all the more important methods. This is the most complete and thorough work on photography which has thus far come to hand in the English language, and is only equalled by a few of the German works. The author in compiling this work has furnished a hand-book which should be in the hands of every student and professional who makes a study of the art-science. The chemistry and optics of photography are all discussed with sufficient fullness for all purposes. There is a word of advice we would give in connection with this book, viz.: If you are interested in photography, no matter whether as an amateur or professional, buy this book. It is to be had of all booksellers for a five-dollar bill, and you would not part with it for double the amount.

A TOO SHORT VACATION, by Lucy Langdon Williams and Emma V. McLaughlin. J. B. Lippincott Co., Philadelphia 1892. A neatly-gotten-up volume of over 200 pages, giving the adventures of two young women on a trip through Great Britain and the Continent, in which the kodak plays a principal part.

ROCHESTER, 1892. The Fourth Annual Report of the Rochester, N, Y., Chamber of Commerce. A well-gotten-up pamphlet of 172 pages, with an illuminated, embossed cover. The work gives a full account of Rochester's chief industries and local attractions. Rochester for years was known as the city of flowers. Of late, however, it is known as the city which "does the rest" after all the world has pressed the button.

WE acknowledge the receipt of a fine photograph, with the compliments of the Eastman Company. The group shows President Harrison and party during their visit tc Kodak Park on last Decoration Day.

FORTSCHRITTE IN DER PHOTOGRAPHIC. A reprint of Dr. J. M. Eder and E. Valenta's contribution to "Bechhold's Jahrbuch der Chemie." The value of the complete volume may be judged from this pamphlet, which in itself is a complete summary of all the late advancements in the whole photographic field, and a useful compendium for all who are conversant with the German language. Published by Richard Meyer, Frankfurt a. M.

PHOTOGRAPHIC WORK. Piper & Carter, No. 5 Furnival Street, Holborn, E. C. London. A photographic weekly. Price, 1*d*. Subscriptions received by Thomas H. McCollin & Co., 1030 Arch Street, Philadelphia. No exchange on our list comes more welcome than this new luminary upon the photographic horizon. Although the youngest venture in the field, it gives evidence of an experienced head upon mature shoulders at the editorial helm. Its advent seems like the return of a long-absent friend.

RECENT PATENTS.

The following list of patents relating to the photographic interest is specially reported by Franklin H. Hough, Solicitor of American and foreign patents, No. 925 F. St., Washington, D. C.

476,357.—Photograph holder, V. J. Augir, Springfield, Mo.

476,562.—Photographic camera, W. Scorer, Havant, England.

476,481,—Photographic prints—apparatus for trimming, H. H. Newcomb, Boston, Mass.

ISSUE OF JUNE 14th, 1892.

No issues

ISSUE OF JUNE 21st, 1892.

447,486.—Photographic Developer, M. Andresen, Berlin, Germany.

447,337.—Photographic Film Holder, T. Sault, New Haven, Conn.

447,243.—Photographic Holl Holder, F. A. Brownell, assignor to the Eastman Co., Rochester, N. Y.

ISSUE OF JUNE 28th, 1892.

477,728.—Photographic paper holder and cutter, T. E. Wood, Kalamazoo, Mich.

477,696.—Photographic plate holder, A. E. Page, Philadelphia, Pa.

478,323.—Photographic Plate Holder, C. H. Lohman, Chicago, Ill.

ISSUE of JULY 12th, 8921.

478,837.—Photographic Camera, H. A. Benedict, New York, N. Y.

478,780.—Photographic Camera, W. H. Bristol, Hoboken, N. J.

478,663.—Photographic printing frame, J. Urie Jr., Jersey City.

ISSUE of JULY 19th, 1892.

479,403.—Photographic Films, Manufacture of, H. M. Reichenback. assignor to Eastman Kodak Co., Rochester, N. Y.

479,186.—Photographic Plate holder, J. H. Hare, Brooklyn, N. Y.

ISSUE of JULY 26th, 1892.

479,587.—S. C. Fay and H. Willis, Rochester N. Y., Magazine Camera.

STUDY BY DANA.

MADE ON AMERICAN ARISTO PAPER.

AMERICAN [illegible]

OF

PHOTOGRAPHY

[illegible]

[illegible]

[illegible]

American Journal of Photography.
September, 1892.

STUDY BY DANA.

MORE OF AMERICAN ART TO PAPER

AMERICAN JOURNAL
OF
PHOTOGRAPHY

THOS. H. McCOLLIN, Managing Editor.
JULIUS F. SACHSE, Editor. XANTHUS SMITH, Associate Editor.

VOL. XIII. SEPTEMBER, 1892. No. 153.

THE DOLLAR OUTFIT SCHEME.

THE photographic periodicals throughout this country, as well as abroad, have teemed time after time with warnings against photographic frauds of various kinds, a class of schemers who not alone strive to prey upon the professional photographer, selecting their victims from the larger class who think it unnecessary to subscribe to the current publications, but who, under the cloak of photography in some shape or form, seek to live upon the community at large—by misleading the innocent and swindling the ignorant.

The "something for nothing" swindler, the "crayon sharp," the "secret process" fakir, the organizer of protective schemes, have all received attention from the various periodicals, and in turn been unmasked, and with a single exception driven from the open practice of their nefarious pursuits.

There is another class of frauds, which for some reason seem to have thus far escaped the stinging blows of the editorial lash, —viz., the parties who largely advertise throughout the country to give away complete photographic outfits as a premium for a certain number of subscriptions, or else to send an outfit to anyone at a ridiculously low price.

One of these misleading advertisements, now before the writer, goes on to state that the outfit consists of

"A strong and perfectly made camera, which will take a picture 2½ inches square, complete with adjustable holder for plate and perfect lens with cap; a package of renowned dry plates; 2 japanned tin developing trays; 1 printing frame; 1 package blue process paper; 1

sheet ruby paper; 1 package photo mounts; hyposulphite soda; developing chemicals; complete and explicit instructions, enabling anyone to take any class of pictures with this outfit." It further reminds the gullible reader that they "are not restricted to any class of picture, but can take landscapes, portraits, buildings, in fact anything. The whole securely packed in a wood case for shipping. Be your own photographer. How many places of interest and friends that are dear do you encounter every day whose image you would like to preserve? With this outfit you can do it and almost without expense. It contains all the necessary materials. Price, only $1.00. Given for a club of eight subscriptions to *Pumpkintown Balloon.*

For the intelligent reader, comment is useless. With the general public, however, the case is different. As a rule, these advertisements only appear in gift-scheme blanket-sheets or country weeklies, using what is known as patent-pages or stuffing. Papers of both of these classes are designed for circulation exclusively within the rural districts, for the sole purpose of throwing out bait to the unsophisticated agriculturist, which is but too often greedily swallowed.

Two cases are recalled at the present writing, which came under our personal notice, and will serve as an illustration for the whole class of gift advertisements.

A retired preacher in a country village, whose attention was drawn to an advertisement similar to the above. The price then was two dollars, which was sent to the publishers. A few days later a letter was received stating that their stock of prêmium outfits was exhausted, but they could send him a much better outfit for five dollars, with which he could earn at least ten dollars per day. The balance of cash was sent. In return came a pasteboard, pinhole outfit, worth about fifty cents, with the information that the camera was warranted entirely free from spherical aberration. The four dry-plates sent were quickly exposed, with the natural result. A correspondence ensued, which ended with the advice not to be discouraged, but to wash the film off the glass, and recoat them, the instructions for which could be found in any good encyclopædia, and required no previous knowledge.

The other case, though not a photographic one, happened in the same community. In response to an advertisement in a

similar sheet, a hard-working laborer sent two dollars for a "perfect timekeeper," expecting, of course, to receive a good watch. Well, in about a week he received by mail a neat memorandum-book, about two by four inches. It contained sixteen pages, bound in pressboard. Two pages were headed with the name of each day of the week. The cost of the book was not over, say, thirty-six cents per dozen. Still it was a "perfect timekeeper." The swindle was even worse than that of the camera outfit.

The worst feature about the above advertisement is that the name of a reputable dry-plate concern is used prominently in connection with the fraud, a circumstance which is, without doubt, unknown to the company.

It is the duty of the photographic press to frown down everything of this character that is apt to mislead the public in regard to the photographic art, bearing in mind that the wider it is disseminated the better, but the aim should always be to advise and guide the prospective tyro to strive for practical results, which are not to be obtained through answering gift advertisements for bogus outfits. They can only be gotten with proper apparatus and chemicals, combined with practice and study.

—J. F. SACHSE.

Magic Picture.—This is the contrivance of F. Tschofen, of Vienna, Austria. It consists in of apparently blank piece of glazed paper or card or other suitable material, which, on being rubbed over with colored pencils or crayons, or with colored powder or the like, produces pictures or words—such as answers to questions—visibly printed above.

A piece of glazed paper, card, or other suitable material is inscribed with letters or words or pictures, preferably in outline, either drawn, written, or printed with a mixture of finely powdered chalk, water and gum arabic, or of any suitable mixture which is capable of imparting to the said lines a rough surface. Such inscriptions will, on being dried, be totally, or at least almost, invisible, but on rubbing the card, etc., thus prepared with colored crayons, powder, etc., the latter will adhere to the roughened lines, but not to the glazed surface of the card, thus bringing out the inscription or picture.—*Paper Mill.*

INDIVIDUALITY IN PHOTOGRAPHY.

BY H. P. ROBINSON.*

IN a recent number of *Blackwood's Magazine* an ingenious writer tries to show that the one thing more than another that now represents primitive man is the baby, and that the nineteenth century British baby differs very little from the savage child of, let us say, a couple of hundred thousand years ago, for a baby is nearly a quadruped and is a reckless creature devoid of conscience. It is, perhaps, a knowledge of the fact that babies are all alike that enables photographers, as it is libellously said, to make the negative of one of the species satisfy the yearnings of many mothers. Now photography is certainly somewhat like this view of the human race in the respect that its immature productions are all alike, and it is not until they grow up and acquire a conscience or soul that they differentiate and show individuality.

Of the immature there is no end, but a wise and invariable provision of nature checks over-production. Nature is always wise, but has no mercy:

> "So careful of the type she seems,
> So careless of the single life;"

and seeing that the world would be overwhelmed by immature photographs, sent beneficent fading to destroy them (always, as in other departments of nature, "so careful of the type," sparing a few, until the art grew old enough to possess a soul or conscience, and then permanent methods were given to us; and even now we sometimes feel inclined to paraphrase the wisdom of Mr. Whistler, and say modern photographs do not fade, and therein lies their deep damnation. This wonderful preservation of a few in all their prestine freshness is suggestive of special providence, for, according to the scientists, who are, of course, always right, like methods should produce like results, and not one of the old prints should have escaped.

Now, evidence of soul or conscience in a picture is art. Yet there are those who will not recognise that we have a soul, but, like Mr. Gilbert's mechanical figures in the *Mountebanks*, are only stuffed full of badly made machienry that sometimes runs down,

* Read before the Photographic Convention, Edinburg, July, 1892.

and always moves with a jerk; and I am not sure we are not suspected of trying to adopt the "put-a-penny-in-the-slot" business to the fine arts.

It is a favourite reproach with the opponents of photography as a picture maker that its results are all alike; it is one of the triumphant proofs of those who will not admit that photography is an art that the unthinking machine makes all its products to the same pattern; that there is no intrinsic evidence in any photograph of its maker. They will no more believe the plainest evidence to the contrary than those of old would believe the angels. They say we are mechanical, and it is of no use pointing out that this wild assertion is obviously untrue; we hear it over and over again, sometimes from one who knows that it is not true, at others from those who are simply ignorant and cannot learn. These are to be pitied. Then there are those whose purpose it serves to deny; and, worst of all, those who have tried, and altered their faith because they failed, those who, as the poet says, "fade away, and dying damn." To the credit of photographers there have been very few of these; however, we have lately had an exibition of one of them. A most enthusiastic defender of photography as an art of a few years ago, but who, perhaps, failed to prove it in his works, was politely asked to contribute to a recent exhibition, and is reported to have replied as follows—it is a lesson on the mutability of things to compare this letter with his former opinions—"I am fully persuaded that photography is not art nor can be, and to encourage exhibitions is to lead a lot of vain people to waste their time in the practice of a useless and vain pursuit."

It has no effect with the prejudiced critic to point out that, if different minds using the same machines produced like results invariably, as machines are expected to do, any one of them who understood the machine ought to be able to turn out a series of masterpieces equal to the best that have ever been produced, always providing, of course, that one machine was as good, and as well brass-bound and French-polished, as the other. Yet they continue to say—and this is one of the latest utterances of science —"The picture painted by the artist is a transcript of his own emotions, but a photograph is not a reflex of human emotions at

all—unless, indeed, accidentally so—but is a direct reproduction of nature, and only through science the offspring of man." We must be grateful to the writer for allowing us the accident.

I am quite ready to confess up to a certain point, and in the hands of the ninety per cent. of the followers of the art who are not good artists, the photograph is in the process; but with the others the picture is in the man (as in painting, only in a less degree, and as far as the materials will allow). The process takes a very subordinate place, and is dominated by the taste, thought, and feeling of the artist, when an artist uses it with what may be fairly called emotional results. Who has not laughed with many of Rijlander's characteristic heads, or wept—yes I have seen even that emotional result produced by a photograph (which was not an accident)—and it is an important part of my argument that all these emotions arose first in the mind of the photographer, and would never have been originated by the same models in the hands of another photographer.

Of all the attempts made to prove that photography was not an art, that which would have most force, if proved, would be that it showed no evidence of individuality; but, on the other hand, if the possession of that quality were proved, it would be one of the strongest arguments in favor of the admission of photography to the brotherhood of art, for individuality in its products necessarily implies the operation of a directing mind behind the "soulless camera."

The latest of the many attempts to define the meaning of the word "art" is a very remarkable one. It is said to be "the apparent disproportion between the means employed and the end obtained." And, as an illustration, the following explanation is given, at which, I think, many a practical photographer will smile.

"Admit, for argument's sake, that a photograph reproduces with a fidelity far beyond anything that the hand of man can attain to, it must still be allowed that the means used to attain this end are infinitely more complicated than the few hairs tied to a stick which the artist uses. Indeed, it might be argued that, if *art* is the apparent disproportion between means and end, photography is not art at all, but science. There is no art on the part of the

lens when it produces its images; it does so strictly in accordance with natural laws. The developer acts as thoughtlessly as any other chemical experiment, and these are the chief factors in every photograph. It is true, you have one small part to play—you must have the *art* of exposing properly; but even here a few shillings will purchase for you a machine to do even this. I do not admit art in development. Art in development is only called in when the exposure has been made without art, and as I have already allowed art in exposure, I cannot allow it here again. With such an infinitesimal part of the picture the outcome of art, is it honest to call a photograph a work of art?" Are we to understand from this singular piece of reasoning that painting is an art because the painter uses "a few hairs tied to a stick?" and does the writer suppose that we claim photography as an art because of its fidelity—that heritage of the youngest amateur? This curious example of scientific knowledge of art is by Dr. J. K. Tulloch, of Dundee, and was written in the present century.

Some writers get confused between degree and kind. In an article in the *Magazine of Art*, a certain writer, who was once a photographer, endeavors to show that photography cannot become art, because its individuality is limited. That it is more limited than painting has always been admitted—we cannot get so far away from the truth as is the painter's privilege—but it is also admitted that all methods of art are more or less limited, and the amount of limitation is only a matter of degree, not kind. The limitations add to the difficulty, but do not alter the status.

Let us run back a little and see if we can find a few workers whose results are totally different from those of their contemporaries, and this invariably. One of the earliest photographers to show genuine art feeling in his work was Rijlander. He died sixteen or seventeen years ago; yet, among many thousands of photographs, it does not require much experience to recognise a Rijlander. There is nothing in the manipulation to distinguish them, except, perhaps, carelessness. It was the mind of the man that was visible, you recognise the man beyond the process. There are still those living who can say, on looking at a collection of old photographs, This is a Francis Bedford, a Dr. Dimmond, a Teuton, a Delamotte,

a Le Gray or Silvy, a Wingfield or a Mrs. Cameron, certainly quite as accurately as an expert in painting would say, This is a Raphael, or Titian, or a Correggio. Then, what becomes of the machine argument?

I will now endeavor to put it another way. Photographs, as I have endeavored to prove, show the mind of the producer—when he has a mind to show; and given two equally gifted photographers, as far as equality can be measured, the one could not produce even a colorable imitation of the work of the other. Neither could dismiss his individuality, let him try how he may. Take two representative men, Rijlander and Bedford:—neither of these accomplished photographers could have imitated the other. They had both original minds, and followed the bent of their genius, and their hands, as well as brains, showed in every picture.

Among the workers of the present day, I could point to dozens of well-known instances, but one or two must suffice. No man's work has been more imitated than that of M. Gale. In every exhibition he is intimated in size, style, framing and signature, yet an expert can decisively say of two pictures, this is Gale, and this the imitation; he can even distinguish between the imitators and say, this is a —, and this a —.

Then in a very different style, there are works of our much respected President, than whom there is no one I would prefer to see occupy the honorable position which defective health compelled me to decline. Perhaps I am not a fit and proper judge of his pictures, but, without altering my opinion of what a photograph should be, I must confess that some of them have captured my admiration for their beauty and respect for other ways than my own when in good hands. Now, some have endeavored to imitate Mr. Davison, and some have renounced photography in despair, because they could only reach the eccentricity without touching the excellence. It is easy to put the image out of focus, but not so easy to make a picture by that means, and Mr. Davison makes pictures. It is easy to copy peculiarities, but not so easy to imitate valuable essentials.

While on the subject of our President, may I be permitted to add—for he is now in a public position and open to our shots—

that, however straitened his views of the practice of photography as an art may have been at one time, his opinions have constitutionally broadened down, until now the key-note of his teaching is liberty for all.

We now come to another proof of individuality. It used to be the practice to insist on unanimity at exhibitions until after the judges had done their work; but this was given up when it became apparent that the judges usually recognised the work of the old hands, and the only nameless ones were new exhibitors. In America—at least, at the Convention Exhibition—the farce of the anonymous is still carried to such an extent that nobody seems to know, officially or otherwise, who the pictures are by until it is to late to be of any use to the exhibitors; and newspaper criticism has to be published without names. For, however the photographs may proclaim their authors, it seems to be etiquette to pretend not to know.

The difference between the works of some of our best photographers and those of the moderately successful can scarcely be due to a scientific cause, except, indeed, to a reversal of the generally received idea; for I think, if the truth were known, it would be found that the producers of the indifferent pictures had much more scientific knowledge than those who produce the most artistic pictures. I am acquainted with a great many of our photographers, but I do not know one of those to whom we are accustomed to look for the chief ornaments of our exhibitions who has any elaborate scientific knowledge. Indeed, their technical methods are so very simple as to seem quite elementary. They usually take a plate of the make to which they are accustomed, a simple pyro and ammonia developer, a handful of hypo and a jug of water, and use them properly; and that is all. They do not bring science to bear even on the exposure at the expense of "a few shillings." They get on without an actinometer. They feel from experience when their plate has had enough, and an actinometer, however perfect, would only confuse them. But, as they endeavor to put taste, thought, and feeling into their pictures, their works necessarily differ from those of the scientist, and the essence of their art is individuality.

My last word must be a word of caution. Be original, be unique if you can, but do not be out of harmony. Individuality goes wrong when it is out of harmony with its surroundings. Eccentricity is very easy, but it does not last. It is open to the meanest capacity, and is often assumed by it; but genius, to be useful, should consist of individuality, backed up by suitability to its environments.

PHOTOGRAPHY FOR THE BUSY MAN.

BY XANTHUS SMITH.

IN one's peregrinations with their camera they are frequently addressed by friends and others with questions relative to the art of photography, and the impression given, in the majority of cases, is that the questioner has a strong interest in the subject, and a decided hankering to attempt the art of taking pictures, but is prevented by the belief that the process is a decidedly difficult one to learn; that in the mere matter of securing a good outfit he may go astray in the very beginning, and, therefore, stands deterred from any attempt whatever to take up the pursuit.

Apart from the professional branch of the art, which is carried on of course as a means of livelihood, the amateurs consist to a considerable extent of the young, who rush thoughtlessly into anything to which their inclination draws them, and of those of large means and ample time, who at the outset feel that they may make the venture, and, should the result be failure, the loss will not be felt. Now there is a large, mature, thinking class who would gladly avail themselves of the uses and pleasures of photography did they not feel completely debarred by the imaginary difficulties. On first turning their attention to the subject, these obstacles prevent themselves: the uncertainty about selecting an outfit from the many offered, the seemingly unfathomable mystery of exposure, development and printing, and the fear of laying themselves open to criticism and ridicule in the matter of artistic selection and effect. So much is this the case with a certain class, who would make the very best recruits to the delightful pursuit of amateur photography, that we only wish we could

reach them all, and, by a little advice and assistance, quickly prove to them how frail are the barriers which appear to intervene between them and success in this most agreeable and instructive occupation.

Let us group together briefly the main points in photography.

The depicting of objects in nature is an innate quality of man —as we see manifest by the rude attempts of savages to portray that which is of interest to them,—and with the advancement of civilization the fine arts advance, and of course the interest in art. We all know what an important part, and how largely attended, are the fine art portions of the great world's fairs that are held from time to time. Everyone, it would seem, is more or less interested in pictures representing scenes and incidents in nature. Art is various, and we may almost say prolific, in its means of representation. One of its means is photography, and photography we may truly say is a means open to every one. Why, therefore, should any one hesitate to avail himself of this means of deriving enjoyment and conveying it to others? The photographic art, as at present practiced, would seem to have been arranged completely for the benefit of the amateur—so simple is it in its practicc. What do we require? A camera; one just suited to our means. Excellent work may be made with some of the quite inexpensive ones. A good lens, a 5x8 rapid rectilinear, will accomplish a vast deal. Three or four flat dishes, a few simple chemicals, and some dry plates, as the ready-sensitized plates are called,—little else than this. Our camera and its appurtenances are of course good, if taken care of, to be laid away indefinitely, and brought forth at any moment. The chemicals and solutions keep indefinitely, and the dry plates keep for years, either before exposure or after exposure. Now, what more could be asked by one who wishes to carry on a pursuit at intervals only?

If your means are limited, do not attempt too much. Let your work be of moderate size. In England it is very common even with skilled amateurs to work the 3¼x4¼ size, though we would not counsel working so small. Practice deliberation in your work. Do not feel necessitated to be continually exposing

your plates, as by careful consideration you will be better instructed by what you do, and derive more lasting pleasure from your productions.

The professional man, the business man or the clerk may find time to practice a recreation of this sort, which may be dropped at any point and resumed again when opportunity arises, and his work will take the direction of his particular bent.

As general viewing upon excursions or tours is one of the most fruitful sources of pleasure in amateur photography, we will offer some hints in this direction.

Grouping and light and shadow are the two principal art qualities to be looked after in photography. Therefore there should always be a principal aim or group in whatever subject may be attempted, and all else in the picture should as far as possible be subservient to this. The light and shadow should be so arranged as to bring out the principal group to the best advantage. If the light is too much back of the group the latter will be buried in shadow, and will sink in and appear dull and heavy, instead of standing out brilliantly, as it should do, and if the direction of the light is altogether from in front, the group will appear weak and flat. Try always, as far as possible, to secure a quiet background and surroundings to the main group. Ill-shapen patches of light and dark scattered about are ruinous to a picture.

Water scenes in landscape, either river or lake, with fine foliage and distant mountains, of course go to form the choicest that is to be had in the way of subject, and in working in such a locality, when you can get varying groups on either side, with open distance in the centre, backed by hills or mountains, the water coming in through the middle foreground, with reflections, and some immediate foreground, earth and rocks or other appropriate frontage, you are sure of securing beautiful and interesting pictures.

Such scenes as those just spoken of do not require figures or animal life. The repose or solemnity of them would be disturbed by the introduction of such accessories. When we come, however, to small domestic scenes and picturesque bits, the case is different, and if we can be so fortunate as to secure appropriate

figures, our work will be much improved. Creek scenes, meadows with willows and borders of woods, are greatly improved by the presence of cows in the foreground, especially if they be picturesque cows, some light and some dark, and not too much scattered, so as to make confusion. The points of light and dark give point to the work. Single figures, especially if standing, come badly into a picture. There should be two or more, and grouped, some sitting or reclining.

Always try to look at your intended subject as a picture before you begin, considering the very best point of view. In using any of the detective cameras, the finder will be found very useful for determining quickly what will make a picture-like arrangement and what will not, and avoid taking trifling subjects, for what may seem like sport at the time will end in disappointment after the trouble and expense of developing and printing have been considered, and it is seen how useless the resulting work has turned out.

When a busy professional man or man of business brings forth his album for criticism, it is always a matter of gratification to us, for, if he have any natural taste at all, we are sure to be pleased by the sight of some nice, and often very original, effects, and what we may say in praise of them is of course a matter of satisfaction to him. Is not this a sort of oasis in the desert of dry law papers or bulky ledgers?

We say to all who have any interest whatever in art, Do not hesitate. Secure an outfit at once and go to work.

Wanted—A crown for the brow of a hill.
Wanted—A snug-fitting shoe for the foot of a mountain.
Wanted—Several hundred women to scour the country.
Wanted—An energetic barber to shave the face of the earth.
Wanted—A lady to wear the Cape of Good Hope.
Wanted—Locks for the Florida Keys.
Wanted—A wise man to teach the Scilly Islands.
Wanted—Some one to love the River Darling.

AN IMPROVED METHOD OF TREATING RESIDUES.

The time-honored method of adding salt—common kitchen salt—to the washings from silver prints is always difficult to displace by improved methods; still, as the ever-increasing pressure of competition causes every professional photographer to seek means of increasing his income, it may yet be that, if he see any distinct gain, he will throw aside prejudice, and take up new plans promising gain. At the outset we may say that chloride of sodium is a very unsuitable precipitant for two potent reasons. In the first place, every printer of experience knows that, when the silver is precipated in the ordinary way, a very long time has to elapse before the traces of chloride subside; it is necessary to have vessels to be used in succession, so that the one first filled may have cleared sufficiently to be ready to empty by the time the rest are full. If this be not done, the liquid run off is "milky," in other words, contains a quantity of finely divided chloride of silver in suspension, and this goes down the sink and is wasted. Secondarily, though the liquid may be quite clear, there is yet a considerable waste; for solution of chloride of sodium dissolves an appreciable amount of silver chloride, and to the extent of this solubility must loss accrue. If any one entertain any doubt on this point, let him very carefully filter a portion of the clear liquid standing over the precipitate, and add it to one drop of the solution of liver of sulphur, which he uses for throwing down silver from the hypo. The considerable discoloration produced is irrefragable evidence of the presence of silver.

Both these objections may be removed by using hydrochloric acid. The impure acid—the muriatic acid of the dry-salter—will suffice. It does not dissolve the silver salt, and it causes the precipitation to be speedy, or perhaps we should say less slow, in falling, and is thus decidedly a gain in material and in time.

But even with this precipitant there is delay, and, where space is of importance, it cannot but be that some silver is wasted through insufficient time being allowed for sudsidence. We have, therefore, been making a series of experiments bearing upon this point, and have devised a method which seems to be all that can

be desired. Starting with a procsss employed in metallurgical operations, we first tried the effect of precipitating the silver as a bromide; but, try it how we would, no benefit resulted in any way commensurate with the increased expense this more costly salt involved.

Our next plan was to add to the washings some substance which would cause a more speedy falling of the chloride. After numerous failures, particulars of which need not be here recounted, we brought into use a soluble lead salt, which might be precipitated at the same time as the silver, and, perhaps, by virtue of its great specific weight, assist the silver to fall by enveloping the particles of silver chloride. This plan met with complete success. So far our trials have been merely on a laboratory scale, and thus not with a large bulk of liquid; but there is no reason to doubt that, when put into actual practice, it will act in a precisely similar way.

Taking a quantity of washings obtained from prints, to cause the laboratory conditions to, resemble as nearly as possible, printing-room work, and dividing it into a number of portions of equal bulk, we placed them in a series of test tubes. The first experiment was a mere tentative trial, but its success was evident. A few drops of solution of lead nitrate were added to one test tube and the precipitant added, a second tube having the same treatment, but with the lead left out. In number one tube the precipitate all sank to the bottom and left a clear liquid in less than a minute, while the second tube was milky half an hour afterwards, and no doubt would take a day or so to become quite clear. We next tried the effect of varying quantities, and we found that there was no gain whatever in increasing the proportions of lead salt beyond a certain small proportion. This proportion, as near as we can judge, would be about one-fifth of the silver salt present.

Next we ascertained the best form in which to add the chloride. The action was so prompt that it was needless to experiment again with bromides. The result was that, though hydrochloric acid was very quick in action, the ordinary table-salt solution was still better. It was then desirable to see whether a more easily

obtainable lead salt—the acetate—would answer. It was quite equal to the nitrate.

We were thus in a position at once to formulate a method for practical use. To each jar of print washing—say, of ten gallons—add a quarter of an ounce of acetate of lead—sugar of lead, it is commonly called—and when completely mixed, add the usual chlorine, either as "salt" or as "muriatic acid," stir for a little time, and allow to subside.

We are hoping that before long we may be able to say how the plan works in practice on a large seale, for Mr. Watmough Webster, who joined us in these experiments, has promised to introduce the method into his daily practice, for a time at any rate, and report the practical results attending what may be termed the lead method of precipitation.—*British Journal of Photography.*

Our Illustrations.—Frontispiece: specimens made on American Aristo paper, negatives from Dana's Brooklyn Gallery. This paper is a collodio-citro-chloride paper, made by the American Aristo Co., of Jamestown, N. Y. In our April JOURNAL (page 147) we referred at length to this paper, giving full working directions for the manipulation. The beautiful results obtained on this paper make it a desideratnm for the professional who keeps abreast of the times.

Our Extra Illustration.—A reproduction in half-tone of one of the earliest if not the very first daguerreotype miniature ever made in a studio, it having been made by Robert Cornelius in his studio, Eighth & Lodge Alley, February, 1840. Reference to this picture is made in the Historical Retrospect of Early Daguerrotype Days, on page 312 of the JOURNAL.

The *Public Ledger* of August 11th, published a summary of our history of the Dawn of Photography, and on August 13th gave us the following editorial notice:

"THE AMERICAN JOURNAL OF PHOTOGRAPHY continues the story summarized in an article in the *Ledger* last Thursday on Early Photography, and makes further remarkable statements concerning the early development of the art in this city. The progress of photography has been very rapid, and always Philadelphia and Philadelphians have been in the first ranks of those who have cleared the way."

AMERICAN JOURNAL OF PHOTOGRAPHY,
SEPTEMBER, 1892.

SPECIMEN OF EARLIEST STUDIO PORTRAITURE.

TAKEN BY ROBERT CORNELIUS, FEBRUARY, 1840, AT STUDIO EIGHTH AND LODGE ALLEY, PHILADELPHIA.

NEGATIVE FROM ORIGINAL BY JULIUS F. SACHSE VIDE PAGE 512, IBID.

EARLY DAGUERRE.

AN HISTORICAL [illegible]

BY JULIUS [illegible]

(Continued from [illegible])

AN exception, however, was [illegible] at the intercession of Hon. F[illegible] Paris. This was in the shape of a [illegible] showed Morse his pictures, and on the [illegible] to Daguerre his model of the [illegible] Daguerre, however, flatly refused to [illegible] Morse [illegible] whatever into the heliographic process.

By a curious coincidence, during Daguerre [illegible] to Morse, the former's house, containing his [illegible] studio laboratory, together with all of his original [illegible] were destroyed by fire.

Snelling, in his "History of the Art,"[6] states that [illegible] home [to New York], Prof. Morse waited with impatience [illegible] revelation of Daguerre's process, and no [illegible] was [illegible] than he procured a copy of the work containing it, and at once commenced taking daguerreotype pictures. At first his object was solely to furnish his studio [illegible] from nature, and before the year 18[illegible] had expired [illegible] succeeded [illegible] obtaining a fair impression of a church [illegible] a w[illegible] the staircase of the old New York City [illegible] the ex[illegible] about fifteen minutes and the manipulat[illegible] the published account.

These experiments led him into a belief in t[illegible] procuring portraits by the process. Consequently during the spring of 1[illegible] Morse made several attempts at portraiture for the purpose. Thinking that it was absolutely necessary to [illegible] the sitters in a very strong light, they were placed on the [illegible] of a building in the full sunlight with instructions to keep [illegible] eyes closed during the exposure, which lasted from twenty [illegible]tes to half an ho[illegible].

[illegible] 1849, p. 3.

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NEGATIVE FROM ORIGINAL BY JULIAN F. SACHSE. [illegible]

EARLY DAGUERREOTYPE DAYS.—IV.

AN HISTORICAL RETROSPECT.

BY JULIUS F. SACHSE.

(*Continued from page 362.*)

AN exception, however, was made in the case of Mr. Morse at the intercession of Hon. Robert Walsh, U. S. Consul at Paris. This was in the shape of a compromise—Daguerre showed Morse his pictures, and on the next day Morse explained to Daguerre his model of the telegraph and its workings. Daguerre, however, flatly refused to give Morse any insight whatever into the heliographic process.

By a curious coincidence, during Daguerre's two-hours visit to Morse, the former's house, containing his diorama, studio, and laboratory, together with all of his original heliographic results, were destroyed by fire.

Snelling, in his "History of the Art,"[6] states that on his return home [to New York], Prof. Morse waited with impatience for the revelation of Daguerre's process, and no sooner was it published than he procured a copy of the work containing it, and at once commenced taking daguerreotype pictures. At first his object was solely to furnish his studio with studies from nature, and before the year 1839 had expired Morse succeeded in obtaining a fair impression of a church building, from a window on the staircase of the old New York City University, the exposure being about fifteen minutes, and the manipulation strictly according to the published account.

These experiments led him into a belief in the practibility of procuring portraits by the process. Consequently during the spring of 1840 Morse made several attempts at portraiture for this purpose. Thinking that it was absolutely necessary to place the sitters in a very strong light, they were placed on the roof of a building in the full sunlight with instructions to keep their eyes closed during the exposure, which lasted from twenty minutes to half an hour.

[6] New York, 1849, p. 8.

When Morse made his first crude attempts at portraiture cannot be definitely stated, in view of conflicting claims and dates given by various authorities. But it was long subsequent to Cornelius, Goddard, and others.

Personally Morse never pressed the claim of having made the first portrait. In a letter to Henry H. Snelling, published in the work before mentioned, he states :[7]

"If mine were the first, other experimenters soon made better results, and if there are any who dispute that I was first, I shall have no argument with them ; for I was not so anxious to be the *first* to produce the result, as to produce it in any way. . . . I lay no claim to any improvements."

Some time during the year 1840, Professors Draper and Morse joined interests, and had a glass building constructed for heliographic portraiture on the roof of the University. In September, 1840, Professor Draper sent a paper to the London *Journal of Science*, describing "The Process of Daguerrotype and Its Application to Taking Portraits from the Life,"[8] in which he states:

"On a bright day, and with a sensitive plate, portraits can be obtained in the course of *five* or seven minutes. The advantages which might be supposed to accrue from the features being more composed, and of more natural aspect, are more than counterbalanced by the difficulty of retaining them so long in one constant mode of expression.

"But in the reflected sunshine, the eye cannot support the effulgence of the rays. It is therefore absolutely necessary to pass them through some blue medium, which shall abstract from them their heat, and take away their offensive brilliancy. I have used for this purpose blue glass, and also ammoniaco-sulphate of copper, contained in a large trough of plate glass, the interstice being about an inch thick, and the fluid diluted to such a point as to permit the eye to bear the light and yet to intercept no more than was necessary. It is not requisite, when colored glass is employed, to make use of a large surface; for if the camera operation be carried on until the proof almost solarizes, no traces can be seen

[7] History of the Art. H. H. Snelling, New York, 1849.

[8] Vol. XVII., p. 223.

in the portrait of its edges and boundaries, but if the process is stopped at an earlier interval, there will commonly be found a stain corresponding to the figure of the glass.

"Different parts of the dress, for the same reason, required intervals differing considerably to be fairly copied, the white parts of a costume passing on to solarization before the yellow or black parts have made any decisive representation. We have therefore to make use of temporary expedients. A person dressed in a black coat, and open waistcoat of the same color, must put on a temporary front of a drab or flesh color, or by the time that his face and the fine shadows of his woolen clothing are evolved, his shirt will be solarized, and be blue, or even black, with a white halo around it. When, however, the white parts of the dress do not expose much surface, or expose it obliquely, these precautions are not essential; the white shirt collar will scarcely solarize until the face is passing into the same condition.

"Precautions of the same kind are necessary in ladies' dresses, which should be selected of tints contrasting strongly.

"It will be readily understood that the whole art of taking daguerreotype miniatures consists in directing an almost horizontal beam of light, and through a blue colored medium, upon the face of the sitter, who is retained in an unconstrained posture by an appropriate but simple mechanism at such a distance from the background, or so arranged with respect to the camera, that his shadow shall not be copied as a part of his body; the aperture of the camera should be three and a half or four inches at least,—indeed the larger the better, if the object be aplanatic.

"Miniatures procured in the manner here laid down are in most cases striking likenesses, though not in all. They give, of course, all the individual peculiarities—a mole, a freckle, a wart. Owing to the circumstances that yellow and yellowish-browns are long before they impress the substance of the daguerreotype, persons whose faces are freckled all over give rise to the most ludicrous results,—a white, mottled with just as many black dots as the sitter has yellow ones. The eye appears beautifully, the iris with sharpness, and the white dot of light upon it with such strength and so much reality and life as to surprise those who have never

before seen it. Many are persuaded that the pencil of the painter has been secretly employed to give this finishing touch."

A curious feature about this combination of Draper and Morse at the New York University, was that from the very start they gave *instructions* in the art.[9] Surely an illustration of the blind leading the blind, when it is taken into consideration that all accelerating mediums were unknown to the *learned* instructors.

The combination, however, did not last very long. Professor Morse, in a letter in possession of the writer, dated February 10th, 1855, thus explains his connection with professional portraiture:

"Professor Draper's other duties calling him away from the experiments, except as to their bearing on some philosophical investigations, which he pursued with great ingenuity and success, I was left to pursue the artistic results of the process, as more in accordance with my own profession. My expenses had been great, and for some time (five or six months) I pursued the taking of portraits by daguerreotype, as a means of reimbursing these expenses. After this object had been obtained, I abandoned the practice to give my exclusive attention to the telegraph, which occupied my whole time."

A xylographic copy of one of Morse's studio efforts has come down to us, and shows some effort at artistic posing. It is printed from the original engraved block made from the daguerreotype miniature. The time of exposure was about twenty minutes

From the fact that in the original the eyes were tolerably well defined, there is a strong supposition that for part of the time the young women opened their eyes to see what was going on. Consequently, when the illustration was engraved the figures were represented with open eyes, the engraver also remedying other defects of the original.

[9] *Fine Art Journal*, December, 1854, p. 382.

A Xylographic of an Early Daguerreotype, by Morse.

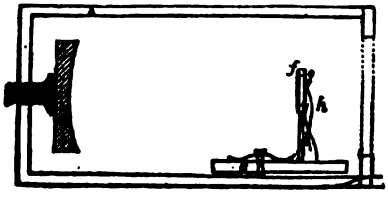
By a comparison of the facts here presented, it will be apparent to the reader that the experiments and results obtained by these two scientists up to this period were of little or no practical value in the development of heliographic portraiture in comparison with those of Cornelius and Goddard in Philadelphia.

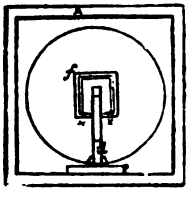
The First Photographic Patent.

Some months after the Cornelius Atelier for daguerreotype miniatures had been successfully established in Philadelphia, an attempt was made by Alexander J. Wolcott and John Johnson to open a similar establishment in New York city, in the granite buildings at the corner of Broadway and Chambers streets.

Wolcott, who was a dentist, it seems had commenced to experiment with the Daguerre process, and had succeeded in obtaining pictures on plates about three-eighths of an inch square.[10]

[10] Humphreys's Journal, Vol. II., 1851.





A. The box or camera, about 4 inches long by about two outside measure. B. The reflector soldered to a brass screw, and mounted in the rear of the box. C. The slide to regulate the focus to the plate-holder. d. The standard to the plate-holder, screwed to the slide. f. The plate-holder frame, having two small ledges * * for the plate to rest upon. g. The plate resting upon the ledges * * and kept against a spring, h. The plates used were about *three-eighths of an inch square.*

Wolcott, who was of a somewhat inventive turn of mind, improved upon this toy, and constructed what he called a "reflecting camera," in which a reflector of eight inches diameter, with twelve inches focal distance for parallel rays, was substituted for a lens arrangement, the idea being that more light could be obtained. The reflector for this purpose was ground and polished by one Henry Fitz, Jr., who had some knowledge of practical optics.

An application for a patent on the apparatus was at once made, which was granted withou delay on May 8th, 1840. The specification of this invention, the first photographic patent granted by the United States, sets forth, viz.:

Specification of a Patent for an Improved Apparatus for Taking Daguerreotype Likenesses. Granted to Alexander S. Wolcott, City of New York, May 8th, 1840.

Be it known, that I, Alexander J. Wolcott, of the city of New York, and State of New York, have invented a new and improved method of taking likenesses from life, of which the following is a full and exact description. At one end of a box a concave reflector (which may either be a piece of solid metal, or of glass silvered) is placed, with the reflecting surface facing the other end, which has an opening corresponding to the size of the reflector. In this opening is a light metal frame, fixed by a thin support to a piece of wood or other material, with which it slides on the bottom of the box, in a direction perpendicular to the face of the reflector and length of the box. This frame is intended to carry the metallic plate, paper, or other material on which the impression is to be made. The plate,

paper, or other material, may be retained in the proper position against the frame by a small spring pressing the plate, paper, or other material on the back, and between which spring and the frame the plate, paper, or other material is slid. A small door should be made on the top of the box for the purpose of observing the focal image. The box should be placed on a table or other support, at such height that the centre of the reflector may be as high as that part of the person which is intended to be in the middle of the picture. When a very small picture of the person is intended to be taken, the focus may be adjusted by a microscope, which may be introduced through a hole in the top or end of the box, or held by the hand at the doorway on the top. When the camera (that is, the box with the reflector) is to be used, the person whose likeness is to be taken should be placed in a chair, to which some suitable support for the head is attached, to enable him to remain perfectly still. The camera should then be placed with the open end immediately opposite to the person. A trial plate is then to be placed or put against the frame that stands in the open end of the box, and the focus adjusted by sliding the piece to which it is attached. The trial plate is then to be removed, and the plate, paper, or other material (prepared in any of the well-known methods for being acted on by luminous or other rays) put into its place, and allowed to remain as long as required to form the image. A convenient size for such camera would be as follows: The box inside, fifteen inches long, eight and a half inches high, and eight inches wide. Reflector, seven inches clear diameter, and twelve inches focus. The plate, paper, or other material, on which the picture is to be formed, is two and a half inches long by two inches wide.

For taking likenesses for breastpins, the reflector may be about two and a quarter inches diameter, and four inches focus, and all the other parts of the camera of proportionate size. That which I claim as my invention, and desire to secure by letters-patent, is the taking of likeness from life by the aid of a concave reflector, placed so as to receive the rays from the person whose likeness is to be taken, and converge them to a focus, on a prepared plate, paper, or other material, placed between the person and the reflector.

ALEXANDER J. WOLCOTT.

A great advantage which was claimed by Wolcott's invention over Daguerre's method, was that the concave mirror produced the *proof in its right position,—that is to say, not reversed.* This, however, was more than counterbalanced by the fact that

the size of the plate was limited, and that such parts as were distant from the centre were represented in a very confused manner.

It was shortly after the granting of this patent that the New York gallery was opened.

This attempt to shorten the Daguerre process by mechanical means, so as to adapt it for portraiture, practically proved a failure, nor was it successful until after a return to the Daguerre camera, combined with the use of bromine as an accelerator,—the secret of which was fraudulently obtained from an employé of Cornelius or Goddard, in Philadelphia.

A diligent search has failed to locate a single specimen of Wolcott's reflected portraiture.

Portraiture Abroad.

No sooner had the patent for Wolcott's reflecting apparatus been granted than John Johnson, his business partner, sailed for England with a few specimen portraits. On his arrival a joint arrangement was affected with Richard Beard, of London, in patenting and working the invention in England.

A portraiture studio was opened in the same year (1840). This was followed shortly afterwards by Claudet, who also opened a studio.

It will be seen that Europe was far behind America in the development of daguerrean portraiture. In France they were even more sceptical, and when it is taken into consideration that in France it took from twenty to twenty-five minutes to take a landscape, the observation of the French author is not to be wondered at, who describes the taking of portraits as "*toujours un terrain un peu fabuleux pour le Daguerreotype.*"

The first portrait obtained by the Daguerre process in France was a picture of the king, Louis Philippe. This was during the late spring or early summer of 1840. The operators were the two opticians, Lerebous and Claude. The exposure was made in the bright sunlight, upon a terrace of the Tuileries.

(*To be continued.*)

[11] Fotografitschesky Ejegodnik. P. M. Dementjew, St. Petersburg, 1892.

ELEMENTARY THEORY OF THE EQUIVALENT FOCUS. III.

BY PROF. HENRY CREW, LICK OBSERVATORY.

Geometrical Construction of Image.—For all practical purposes we may now consider the lens as consisting of its two principal planes, drawn at right angles to its optical axis. To find the place and size of the image, we shall not need to know anything concerning the optical properties of the glass or the curvature of the surface. In fig. 9, let p_1 and p_2 be the principal points; ab, the object; $a'b'$, the image.

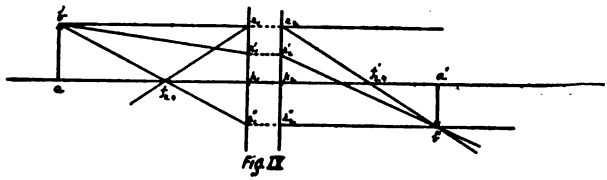


FIG. 9.—Illustrating the use of the principal planes in constructing images.

To find the image of any point b, draw the ray br, parallel to the axis. Since r_2 is the image of r_1, every ray which passes through r_1 passes also through r_2; and since the ray was drawn parallel to the axis, it will, on emergence, pass through $f'_{2,4}$. The ray br, after refraction, therefore, emerges in the direction $r_2 f'_{2,4}$. Since r_1 and r_2 are each points on the principal planes, and the one the image of the other, they will each lie at the same perpendicular distance from the axis. Since the principal planes are planes of unit magnification, the unit of r_1 is r_2, a point on the second plane determined by drawing $r_1 r_2$ parallel to the optical axis. The ray $r_2 f_{2,4}$ is therefore perfectly determinate. In like manner, the ray $b f_{2,4}$ is perfectly determined, since it emerges parallel to the optical axis and at the same distance from the optical axis at which the *incident* ray cuts the *first* principal plane. The point of intersection, b', is the required image of b.

In like manner, it may be shown that any other ray, br'_1, cuts the *second* principal plane at the same height at which it strikes the *first*.

It must not be forgotten that the diagram in fig. 9 does not give the actual direction of the ray *in* the second medium, or glass, but that it does give the true direction of the ray before the incidence and after emergence. This construction, it will be seen, is identical with that for a single refracting *surface*, except that in the case of a *lens* we must

consider each point on the surface as double and separated by a distance equal to that between the principal planes.*

Distance apart of the Principal Planes.—Eqs. 25 and 26 give us the distance of the principal planes from the corresponding principal foci; but one frequently wants to know the separation of one plane from the other.

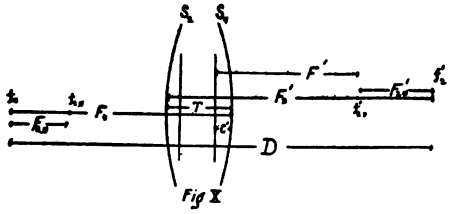


FIG. 10.

Let T be the thickness of the lens, then (fig. 10)

$$T - D = F'_2 - F_4$$

$$= \mu \left(\frac{R_2 - R_4}{\mu - 1}\right) \quad . \quad . \quad . \quad . \quad . \quad \text{Eq. 31}$$

The distance between the principal foci of the lens is

$$-F_2 - F_{2,4} + T + F'_4 + F'_{2,4}$$

or

$$T - F_2 + F'_4 - \frac{F_2 F'_2}{D} - \frac{F_4 F'_4}{D}$$

and, therefore, the distance between the principal planes, which we shall call H, will be

$$H = T - F_2 + F'_4 - \frac{F_2 F'_2}{D} - \frac{F_4 F'_4}{D} + F - F'$$

$$= T - F_2 + F'_4 - \frac{(F_2 - F'_4)\,(F'_2 - F_4)}{T - F'_2 + F_4}$$

* It will be seen from fig. 9 that any incident ray passing through p_1 will emerge from the lens in a direction which is parallel to its original direction and which passes through p_2. If the first and third media were always the same, this might be taken as a definition of the principal points. There are *always* two points which enjoy this property, viz., that an incident ray through one emerges in a parallel direction through the other; but when the first and last media have different refractive indices, these two points do not coincide with the principal points. They are called the *nodal points*, and include the principal points as a special case. This special case, however, is the only one ever met with in photography.

$$= \frac{T\,[T - F_2 + F'_4 - F'_2 + F_4]}{T - F'_2 + F_4}$$

$$= T\left[\frac{T - (R_2 - R_4)}{T - \mu\left(\frac{R_2 - R_4}{\mu - 1}\right)}\right] = T\,\frac{T - R_2 + R_4}{D} \quad . \; . \; . \; . \; \text{Eq. } 32$$

If this expression yields a negative value for H, as frequently happens with a "rectilinear" lens, we know that the incident ray strikes the *second* principal plane before it meets the *first*.

Distance of principal planes from surface of lens.—What the photographer most frequently wants to know is, how far the *second* principal plane is from the rear surface of the lens, because the equivalent focus is the distance from the second principal point to the ground glass. Let us call this quantity C′, and the distance of the front surface (S_2) from the *first* principal plane let us call C. Then (fig. 10),

$$C' = F'_4 + F'_{2,\,4} - F'$$

$$= \frac{F'_4}{D}\,(D + F'_2 - F_4)$$

$$= \frac{F'_4 T}{D} = -\frac{R_4}{\mu - 1}\left(\frac{T}{T - \frac{\mu}{\mu - 1}\,(R_2 - R_4)}\right) \quad . \; . \; . \; \text{Eq. } 33$$

In like manner,

$$C = \frac{F_2 T}{D} = -\frac{R_2}{\mu - 1}\left(\frac{T}{T - \frac{\mu}{\mu - 1}\,(R_2 - R_4)}\right) \quad . \; . \; . \; \text{Eq. } 34$$

Eq. 33 tells us just how far away the back surface is from the point p_2, the point from which the equivalent focus is measured. C′ is negative in nearly all lenses except a meniscus with the face of greater curvature than the back face.

Combination of Lenses.—In the ordinary photographic lens, however, we shall have to deal with a combination of lenses. Let us, therefore, proceed to find where the cardinal points of such a combination lie.

Consider two lenses centred upon the same optical axis *a a′*, fig. 11. We shall use the same notation that we have already used for two surfaces, with this difference only, that each surface will here be replaced by the two principal planes of the corresponding lens.

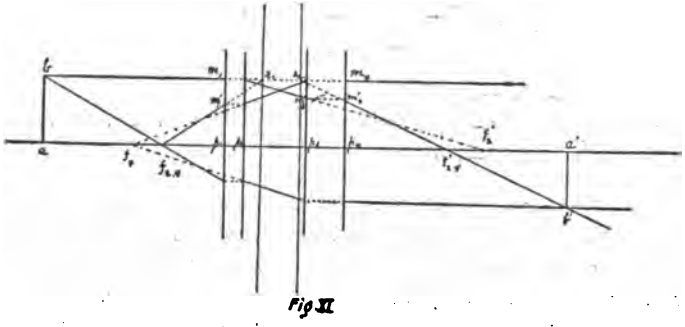


Fig XI

FIG. 11. Illustrating the cardinal points of the ordinary doublet.

Let p_1 and p_2 be the principal points of the first lens; p_3 and p_4 the principal points of the second lens; f_4 the principal focus of the second lens; $f_{2,4}$ and $f'_{2,4}$ are the first and second principal foci of the combination respectively: call the distance $a f_2$ (not marked in the figure), L_2; and $a' f'_4$ call L'_4, as before.

For the first lens we have, by Newton's rule,

$$L'_2 = \frac{F_2 F'_2}{L_2}$$

where L'_2 is the distance from the second principal focus of the first lens to the image produced by the first lens; and for the second lens,

$$L_4 = \frac{F_4 F'_4}{L'_4}$$

where L_4 is the distance from first principal focus of the second lens to the image produced by the first lens.

And since

$$L'_2 - L_4 = D$$

we have

$$D = \frac{F_2 F'_2}{L_2} - \frac{F_4 F'_4}{L'_4}$$

To obtain the position of the first principal focus of the combination, we have only to put

$$L'_4 = \infty$$

which gives

$$L_2 = \frac{F_2 F'_2}{D} = F_{2,4}$$

To get the second focus,

$$L_2 = \infty$$

$$L'_4 = -\frac{F_4 F'_4}{D} = F'_{2,4}$$

whence

$$\frac{F_{2,4}}{L_2} + \frac{F'_{2,4}}{L'_4} = 1 \quad \ldots\ldots\ldots\ldots \text{Eq. 35}$$

This expression is identical in form with that which holds for a single refracting surface.

By referring the conjugate points to the principal foci of the combination, instead of the foci of the separate lenses, one obtains, in like manner (see fig. 11),

$$K_{2,4} = L_{2,4} - F_{2,4}$$

$$K'_{2,4} = L'_{2,4} - F'_{2,4}$$

whence follows

$$K_{2,4} K'_{2,4} = F_{2,4} F'_{2,4} = -\frac{F_2 F_4 F'_2 F'_4}{D^2} \quad \ldots\ldots \text{Eq. 36}$$

Newton's rule holds, therefore, also for a *combination* of lenses: the only requirement being the usual one, that the conjugate points shall be measured from the principal foci of the combination.

Size of Image produced by Combination.—From similar triangles, fig. 11 (which corresponds in all respects to fig. 5, except that each point in the surfaces S_2 and S_4 has been doubled and separated), we have

$$\frac{I}{K_{2,4}} = \frac{p_1 m''_1}{p_1 f_{2,4}} = \frac{p_1 m''_1}{F_2 + F_{2,4}}$$

and

$$\frac{-I'}{F_4} = \frac{p_1 m''}{D + F'_2}$$

Eliminating $p_1 m''_1$, we have

$$\frac{I'}{I} = -\frac{F_4}{K_{2,4}}\left(\frac{F_2 + F_{2,4}}{D + F'_2}\right) = -\frac{F_4 F_2}{K_{2,4} D} = +\frac{K'_{2,4} D}{F'_4 F'_2} \quad \ldots \text{Eq. 37.}$$

Focal length of a Combination.—A combination of lenses has a pair of principal planes as well as a single lens. They are of similar importance and are defined in the same way. Making the image of the same size as the object and at the same time erect, we shall obtain the distance of the principal planes from their respective foci, and thus get the "*equivalent focus*" of the combination.

Let

$$\frac{I'}{I} = +1$$

Then, by Equation 37,

$$[K_{2,4} =] \; -\frac{F_2F_4}{D} = -F, \text{ say}, \quad \ldots\ldots\ldots \quad \text{Eq. 38.}$$

and

$$[K'_{2,4} =] \; + \frac{F'_2F'_4}{D} = -F', \text{ say}, \quad \ldots\ldots\ldots \quad \text{Eq. 39.}$$

Since $F_2 = -F'_2$ and $F_4 = -F'_4$, it is evident that the two focal lengths of the combination are equal, that is,

$$F = -F'$$

From the signs which we have given F and F′, it will be evident that they are measured in a direction opposite to that of $K_{2,4}$ and $K'_{2,4}$, viz., from the principal plane to the focus, and *not* from the focus to the principal plane.

Position of the Principal Planes of a Combination.—For the sake of clearness, we shall first determine these geometrically; then, for the ease of computation, we shall obtain an analytical expression for their distance from each other and for their distance from one surface of the combination.

Draw, in fig. 11, any parallel ray, bm_1, emerging from the first lens and incident on the second; it will be directed towards f'_2: its point of incidence m'_3 is therefore determinate, hence also is m'_4, for $p_3m'_3 = p_4m'_4$. In the last medium the ray will pass through the principal focus, $f'_{2,4}$, and hence the direction of the ray, $f_{2,4}m'_4$, will be determinate. Draw the ray $f_{2,4}m'$, such that after refraction through both lenses it will coincide with bm_1. The point at which these two emergent rays intersect, r_2, will be a point on the second principal plane of the combination, for r_2 is evidently the image of r_1 and is at the same distance from the optical axis. The first principal plane of the combination is, therefore, that plane which passes through r_1 and is perpendicular to the optical axis; in like manner, the second principal plane passes through r_2 and is perpendicular to aa'.

Analytically, we have for the distance between the principal foci of the combination (fig. 11),

$$-F_{2,4} - F_2 + H_1 + F'_2 + D - F_4 + H_2 + F'_4 + F'_{2,4}$$

where H_1 and H_2 denote the distance between the principal planes of the first and second lenses respectively.

Let H denote the distance from the first to the second principal plane of the *combination.*

Then

$$H = (-F_{2,4} - F_2 + H_1 + F'_2 + D - F_4 + H_2 + F'_4 + F'_{2,4}) - 2F'$$

Let $W_{2,3}$ denote the distance between the second principal point of the first element and the first principal point of the second element, *i.e.*, the distance between p_2 and p_3, in fig. 11.

Then

$$D = W_{2,3} - F'_2 + F_4 = W_{2,3} + F_2 + F_4 \quad . \quad . \quad . \text{ Eq. 40.}$$

whence

$$H = H_1 + H_2 + W_{2,3} + F'_2 + F'_4 - \frac{(F_2F'_2 - F_4F'_4 - 2F_2F'_4)}{W_{2,3} + F_2 + F_4}$$

or

$$H = H_1 + H_2 - \frac{W^2_{2,3}}{F'_2 + F'_4 - W_{2,3}} \quad . \quad . \quad . \quad . \quad . \text{ Eq. 41.}$$

From Equation 41 it will be seen that if we combine two ordinary converging lenses the separation of their principal planes will at first diminish as $W_{2,3}$ increases. Presently when

$$H_1 + H_2 = \frac{W^2_{2,3}}{F'_2 + F'_4 - W_{2,3}}$$

the two planes of the combination coincide. H now changes sign and goes on increasing in value as $W_{2,3}$ grows larger. The principal planes have now passed by each other. Finally, when

$$W_{2,3} = F'_2 + F'_4$$

H becomes infinitely great, which means that one or both of the principal points are at infinity. This case is realized in the ordinary astronomical telescope, where the principal points of the combination made up of the objective and eyepiece are each at infinity. These two infinities, however, are not equal, but bear to one another the ratio of the focal lengths of the objective and eyepiece.

Distance of Principal Points from Surface of Lens.—Equation 33 tells us that the distance from the back surface of the combination to p_4, is

$$\frac{F'_4 T_2}{D_2}$$

where the subscripts of T and D show that these quantities refer to the second lens.

It is evident that the distance from p_4 to the second principal point of the combination is $F'_4 + F'_{2',4} - F'$ which is easily transformed into

$$\frac{F'_4 W_{2',3}}{D}$$

where D is the distance between f'_2 and f_4. So that the total distance from the rear surface of the combination to the second principal point is the sum of the two preceding distances. Call this sum C'. Then

$$C' = \frac{F'_4 W_{2',3}}{D} + \frac{F'_4 T_2}{D_2}$$

or

$$C' = F'_4 \left(\frac{W_{2',3}}{D} + \frac{T_2}{D_2} \right) \quad \ldots\ldots \text{Eq. 42.}$$

C' is the correction which must be applied to the "back focus" to obtain the "equivalent focus."

(*To be continued.*)

World Fair Notes.—In front of the Administration Building at the Exposition, the largest fountain in the world will toss graceful streams and excite the admiration of millions of spectators. It is now being constructed in Paris by Sculptor MacMonnies, who is acknowledged to be one of the very best of living artists. The idea of the fountain is that of an apotheosis of modern liberty—Columbia—and will take the shape of a triumphal barge, guided by Time, heralded by Fame, and rowed by eight standing figures, representing on one side the arts, and on the other, science, industry, agriculture and commerce.

This barge is preceded by eight sea horses, forming a semi-circle in front, and mounted by eight young men as outriders, who represent modern commerce. The smallest figure is some twelve feet in height, and the largest twenty feet. The design of the basin is circular—150 feet in diameter—and is flanked on each side by columns 50 feet high, surmounted by eagles.

The water is furnished by a great half circle of dolphins in the rear and by a system of jets which entirely surround the barge and figures. At night the fountain will be illuminated by electricity after the principle employed in fountains in the Champ de Mars. Molders and other artisans are working day and night in getting this immense fountain ready in time.

FOCUSING AND THE USE OF DIAPHRAGMS.

BY JOHN CLARK.

IN cross-heading this article I have followed the order adopted by the publishers in their invitation to competitors, but as correct focusing depends to a large extent on the proper use of diaphragms or stops, I shall reverse the order, and deal with them first.

The photographic lenses in general use are of two classes, single and compound, and with both, stops are employed, although for very different purposes; in the first they are absolutely necessary, while in the second they are only used as a means of improvement.

A single lens, often spoken of as a landscape lens, whether plano-convex or meniscus, cannot be corrected for spherical aberration, the rays from toward the margin coming to a focus nearer the lens than those from towards the centre. The only remedy for this, unless the image were to be received on a concave plate, is the placing of a stop at some distance in front of the lens, so as to cut off the objectionable marginal rays, and let the picture be formed only of such central pencils as come practically to a focus on one plane.

In the case of a compound lens, spherical aberration has to a large extent been eliminated, so that with a full working aperture, as fixed by the maker, it will, if of a good quality, produce a sharp image, but a sharp image of only such objects as are on one plane; an object at, say, twelve feet being perfectly sharp, while those at ten and fourteen are out of focus. This applies most particularly to portrait lenses, but in a less degree to most compound varieties, is generally spoken of as want of depth of focus, and remedied more or less in proportion to the size of the stop employed. This will be easily understood from a consideration of the fact that the rays from the upper and lower margins of, say, a lens of three inches diameter, cross or come to a focus at, say, a distance of eight inches, at a much wider angle than those from the upper and lower edges of, say, a half-inch stop, some-

thing, in fact, like as 20 to 3. To secure a sharp image of the rays crossing at the wider angle, the focusing screen must be placed exactly at the crossing point, while on those at the much smaller angle it may be moved for a certain distance to and fro without visibly affecting the sharpness. In other words, objects both in front and behind that which had been specially focused appear sufficiently sharp, and thus "depth of focus" is obtained.

Although the securing of depth of focus be the main object of the stop in a compuond lens, it also tends to flatten the field. Except in the case of the new "Anastigmat," it has been hitherto impossible to altogether eliminate spherical aberration from even the best type of compound lens, and although the depth of focus is not needed there, the small stop is absolutely essential to secure perfect marginal definition.

Of course, it goes without saying that the smaller the stop the less will be the light that is transmitted to the plate, and consequently the longer will be the exposure, but the amateur, and the professional also, as he is not unfrequently in blissful ignorance of the nature and properties of his lens, should remember that the size of the stop *per se* has no meaning, and only becomes intelligible when its relation to the focal length of the lens is known.

Stops, therefore, should always be thought of and spoken of in that relation, viz., as *f*–x, x being the proportion the aperture bears to the focus of the lens. Until a few years ago, each maker made the apertures of his stops according to his own fancy, although there was a kind of understanding that each smaller stop required twice the exposure of its next largest neighbor, but modern opticians generally adopt what is known as the U. S., or universal system.

The largest working aperture of the average portrait lens is one-fourth of its focal length, and the stop, consequently, is marked *f*–4. The U. S. takes that as the unit, and also marks it No. 1. A little calculation shows that if the aperture be reduced to 1½-fifths of the focal length, it will admit just half of the light admitted by the one-fourth, and it is marked *f*–5-6, with the U. S. No. 2, and so on through as many stops as can possibly be required.

Thus: *f*–8, No. 4; *f*–11-3, No. 8; *f*–16, No. 16; *f*–22-6, No. 32, *f*–32, No. 64; *f*–45-2, No. 128.

In this way, not only is the relation which each stop bears to the focal length of the lens shown, but also, the exposure required with any one stop on any particular plate being known, the time with any of the others is seen at a glance. For example, if it is known that *f*–22 needs two seconds, *f*–32 will need four, and *f*–16 only one; or if *f*–4 requires one second, then the U. S. numbers behind each stop give the respective number of seconds needed.

Amateurs whose lenses are not so marked could hardly take the trouble to alter the openings of their stops, but they should certainly ascertain the *f* value of each of them, so as to be able to communicate intelligibly with their brethren. The first step is, of course, to ascertain the equivalent focus of the lens. If a single one, all that is required is to focus carefully some distant object, and measure the distance between the back of the lens and the focusing screen. With a compound lens the operation is more complicated. There are various methods by which it can be accurately accomplished, some of which may be printed in the future, but in the meantime it may be managed with sufficient accuracy in a simple way. Focus, as in the case of a single lens, on a distant object, and measure the distance between the diaphragm slot and the focusing screen, which generally will be near enough for most practical purposes. Suppose the focus is found to be 10 inches; bring that that to tenths = 100, and ascertain the number of tenths in each of the stops. Suppose one should be four-tenths; divide the 100 by 4, which will give 25, and shows that stop should be marked *f*–25, and so on with all the rest. A smaller fraction than a tenth, a sixteenth, or, better still, a millimeter, for the reduction of the focus and measurement of the stop, will admit of more refined measurements, but tenths will do very well.

Having thus laid the foundation, as focusing and the proper use of the stops go hand in hand, I now proceed to that important operation.

The first essential is a very fine ground glass. If the camera has not that, it may be improved by oiling, or, better still, by

rubbing in a solution of wax in turpentine, and rubbing off as much as possible. For very fine work a good plan is to cement with Canada balsam a microscopic glass cover in the centre of the focusing screen, and employ a focusing glass or Ramsden's eyepiece adjusted so that its focus falls exactly on the front of the focusing screen.

If the object in view be such as the copying of a map, whose sharpness to the edge is a *sine qua non*, the adjustments as to size, positions, etc., may be made with full aperture or a large stop, and then stops smaller and smaller must be put in and the image examined until the desired result is obtained.

For portraiture, sharpness all over the plate is not necessary, and sharp backgrounds not desirable. Therefore *f*–4 or *f*–8 should be used, and in the case of sitting figures, where the projecting knees may be out of focus when the head is in, the swing-back should be employed as a means of correction.

It is in landscape work, however, that focusing assumes almost the dignity of a science, and in which, from an art point of view, the use or abuse of the stop may make or mar a picture. Those whose only aim is to produce what are sometimes called topographical landscapes have only simple duties to perform—to ascertain the point from which the most pleasing composition can be obtained, focus sharply any prominent object, slip in stop *f*–32 or smaller, and give the necessary exposure. But pictures, or rather photographs, so produced are destitute of that which gives the greatest charm to a landscape—atmosphere; and as the various distances are all almost equally sharp, the unsatisfied eye wanders, like Noah's dove, from point to point without finding a place on which to rest.

The picture maker, or true photographic artist, has a different end in view. He wants to make a picture in which the eye shall be led to that which is its *motif* and made to rest there, corraled in from wondering, as it were, by the less sharply defined subordinate parts, while a kind of halo of mystery is suggested by the almost imperceptible atmospheric haze, rather felt than seen in the distance. He, too, like his topographical friend, places his

camera on the well-studied point of view, and knowing that the effect of a picture, when confined within the limits of the focusing screen, is often very different from that produced by looking at it in the open, carefully examines it with a large stop, or full aperture. Composition and light and shade satisfactory, and the *motif* clearly defined in his mind, the general effect is carefully studied, and, until he becomes indeed an experienced hand, tried with stops of various sizes and even by putting the principal points of the *motif* itself more or less out of focus. Far be it from me to recommend the principles of the "fuzzy school," but there *are* subjects that are improved by the removal of razor-edged sharpness.

Working on these lines, the photographic artist will find that the great majority of subjects will be most successfully and artistically photographed with stops varying from *f*–16 to *f*–22, and I may add that I have exhibited pictures that were both admired and medaled, and the only stop I carry is three inches of hard rubber having at one end an aperture *f*–16 and one *f*–22 at the other.—*Canadian Photographic Journal.*

Swiftness of a Sword Thrust.—The process of photo-chronography or the kindograph, is used with good effect for measuring the rapidity with which a sword or sabre is thrust.

The straight thrust is the most important in fencing, and only an expert will be able to thrust his sword quickly enough to take advantage of the uncovered position of his antagonist. To measure the rapidity with which this is done, the fencer is placed before a black background. The blade of the sword is covered with chalk, and a small ball of wax is stuck to the point of the same. The apparatus with its rotating disk is set in motion, the fencer makes his pass, and on the sensitive plate is marked, with utmost accuracy, the route described by each thrust.

In the case illustrated, there were nineteen passes, one following upon the other at an interval of one-fiftieth of a second. This is shown by the nineteen dots on the plate, and each pass has lasted, therefore, nineteen-fiftieths, or less than four-tenths of a second.

Aside from this, the plate also shows the curve described by the point of the sword, caused by the simultaneous movement of the right arm or leg of the fencer. Thus fencers can be compared with each other as to their adroitness, demonstrated by the impression on the plate.—*St. Louis Post-Dispatch.*

CELESTIAL PORTRAITURE.

THE New York *Sun* of the 12 ult. announces that the great and unprecedented job of officially photographing every Chinaman in the United States, under the authority of the Federal Government, has been begun, as provided for by the Act of Congress adopted in the month of May last, and signed by President Harrison, against the remonstrance of the Chinese Government, made through its Minister at Washington.

When this unprecedented job is done, our Government will be in possession of the photographs of the whole of the 130,000 (according to Porter's census) or 140,000 Chinese residents of the United States. In fact, it will have three photographs of each of them, for each and every one of them all is required by law to have three copies of his photograph taken, one copy to be deposited in the Federal archives, one copy to be held by the Internal Revenue Collector, and one copy to be retained by the photographed person. It is provided by the law, as expanded by Secretary Foster of the Treasury Department, that no tintype shall be accepted, and that genuine photographs, properly so called, shall be required in all cases.

Our Government will soon possess the most wonderful collection, the most gigantic pile of photographs ever taken by the order of the Government of any country in the world. It will be worthy of the inspection of ethnologists, mind readers, phrenologists, physiognomists, psychologists, contortionists, and all observant persons. It may be hard to discriminate between one Chinaman and any other; but we suppose that the difficulty can be overcome by close, careful, and persistent study of the faces through the aid of scientific appliances. We hold that the photographs ought to be classified. Those of the Chinamen who wear queues ought to be separated from those who do not; those who have been converted to Christianity should be separated from those who worship Joss. Such of them as play fan-tan or hit the pipe, should be separated from such as do not. Thus we would be assisted in making a scientific study of them all, and

in drawing deductions that might be useful or humorous. A great national museum ought to be established in which all the Chinese photographs might be seen in line on the walls.

But we are not only, under the new law, to have the photographs of all our 130,000 or 140,000 Chinamen; we are also to have the weight and height of every one of them; we are to have the age of each of them; we are to have the proper names of all of them, written either in the English alphabet or in Chinese characters. Still further, it is prescribed in Secretary Foster's regulations, issued under the authority of the Act of Congress passed in May last, that the "color of eyes" of every Chinaman in the Uuited States shall be given, so that he can be identified at any time by an Internal Revenue Collector.

When all these things, and several other things not here mentioned, have been done, each Chinaman shall be registered in the collection district in which he resides; the Collector shall give him a numbered and signed certificate; the number of the certificate, and the name of its holder shall be written across the photograph, and red ink only shall be used by the official writer. Thus it is prescribed in the official regulations issued by the Treasury Department and signed by Secretary Foster.

When a Chinaman has been photographed, weighed, and measured; when his optical and other peculiarities have been marked and recorded; when he has been registered and has got his certificate numbered in red ink; when he has paid the sum of $1 into the Treasury of the United States through the Internal Revenue Collector, then—then what? He shall, under Secretary Foster's regulations, "be lawfully entitled to remain in the United States."

As already announced, we have begun to enforce the new law adopted by Congress for the regulation of our Chinese residents. The Internal Revenue Collectors in the States of the Pacific coast where the Chinamen abound to the number of nearly 100,000, have begun to enforce it. The Collector of the Rochester district, in the State of New York is enforcing it this week. The Collectors of the 2d and 3d districts are almost ready to enter upon

the job of enforcing it in New York and Brooklyn, where there are four or five thousand Chinamen.

General Kerwin has ascertained that every Chinaman hereabout is perfectly willing to get his photograph taken, and pay out his $1 for a certificate. But we are not surprised to learn that the Chinese Minister at Washington is preparing to leave the country.

The Government of the United States never before undertook such a gigantic job in photography as it has now in hand, according to the statute enacted by Congress and under the regulations of the Treasury.

WANTS TO BE A PHOTOGRAPHER.

ANY one who has ever had editorial charge of a periodical, newspaper or magazine, knows how many communications reach the sanctum asking for advice and information. A photographic magazine is no exception. During the past month the following letter was received from an inland town in Pennsylvania. Inquiry proved the writer to be a responsible party, and that the communication was sent in good faith. With the exception of locality and signature we produce it *verbatim et literatim* for the amusement of our readers.

MISTER EDITER, SIR:

Please unt let me a know wat a complead fotegraf oudfits will cost me mabe camera, chememicals unt all complead to make picters wid from 3¼x4¼, 4x5, 4¼x6½, 6½x8½ i vould likes to stard in de bisness as i never had no expereance, vould likes you to gives me some informations i got 1 of your Journals unt looks dru de pak for were to puy one cameras unt uder dinks.

Now pleas unt dells me vich of dem cameras can i takes picture in a room wichout skye lite, tells me can i takes a buildings picture clear on cloudy weathers. pleas unt kin i takes gems & tintype wichone cameras i vold likes to take tintypes unt outher pictures pleace unt fine the price all complte how much money i want to start in do dink you can tel me all aboud id so i can makes a compleat pictures on my own expereances i am a mittle age man unt got a gute schul edeucations give me full information unt i vill starts rite in. yours—

BROMIDE ENLARGEMENTS FOR THE WORLD'S FAIR.

SEVERAL years ago the government decided to secure the originals or copies of all paintings, works of art and old books that pertained to the life of Columbus, the discovery of America and the events which were connected with that discovery. Artists were sent abroad to copy the famous paintings in European galleries, and to hunt for rare pictures which would throw light upon the historical scenes of Columbus' time. Accurate photographs were taken of paintings, old maps and statues, and a contract was then made with the Eastman kodak company at Rochester, N. Y., to enlarge these to attractive size.

The early home of Columbus in Genoa, the convent where he was educated, his appearance at the courts of Spain and Portugal, while endeavoring to secure aid in carrying out his voyage, and many scenes in Spain and Italy during that historic time, which were painted by celebrated artists of that period, are brought vividly to the eye by means of these photographs.

"Many of the photographs are natually indistinct, as the colors in the original paintings have become faded by time. A large number of the pictures were enlarged on bromide paper and finished in crayon. Many of the portraits were reproduced in oil, and some of the more striking pictures in water-colors and pastels. The average size of the enlarged picture was forty by fifty inches, but many of them are much larger. After the pictures have been shown at the World's Fair, they will probably be placed in the art museum of the Smithsonian Institute at Washington."

Perhaps the most interesting part of the collection is the different portraits of Columbus, of which there are nearly sixty. These were copied from the original paintings in the art galleries of Venice, Milan, Florence, Rome, Madrid, Lisbon, and other cities and represent the great navigator in youth, in middle life and old age. Some of the pictures give the discoverer the look of a Dominican monk, with lean and austere countenance, a high forehead and scanty locks of hair. In others he appears as a jolly round-faced sailor, apparently more fond of his grog than of discovering new continents.

It is not generally known that there is not an original portrait of Columbus in existence, and that the first picture of him was painted nearly fifteen years after his death, and from descriptions furnished the artists by his former friends and associates. Perhaps the most famous of these is the Giovio portrait, as it is called. About the period when this was painted, several eminent artists in other countries also made portraits of Columbus. It is not improbable that they received their information as to his personal appearance from the same sources, and as there is a marked resemblance between several of these paintings, it is evident that they are fairly correct. The Yonez and Rincon pictures of the court of Spain are the oldest in that country, and are claimed by that government to be authentic. Another famous portrait is the one which hangs in the palace of the Ministry of Marine at Madrid.

The photographs of these noted paintings represent Columbus to have been a man of medium height, with aquiline nose, high forehead, and a face that was marked with much intelligence and individuality.

The collection also contains photographs of the maps drawn by Columbus and his contemporaries of the new world. In some, South America has the shape of a large round apple, but in the last one drawn by Columbus, the outline of the coast and the appearance of the country is accurately described. In the first chart of the West Indies, drawn by Juan La Cosa, Columbus' pilot, he is represented as bearing the Christ-child across the Atlantic, symbolic of carrying salvation to the new world.

There are also many quaint pictures or scenes in the New World which were painted by European artists from the descriptions brought back by the first voyagers. The strange appearance of the natives, the vast forests of the new country, and the animals, many of which are portrayed with human heads and faces, are to be seen in many grotesque pictures.

Many of the maps and books sent to the company to be photographed were loaned to the United States by Spain and Italy, and were very rare and valuable. They were all insured by the government while they remained in Rochester. An old and stained book of charts bound in ox-hide, which dated back to 1520, was alone insured for $15,000.

THE PHOTOGRAPHIC SOCIETY OF JAPAN.

THE annual meeting of the society was held on Friday, May 13th, in the rooms of the Geographical Society of Japan, Nishikonya-cho, Tokyo.

There was an exhibition of work by members and of apparatus, during the day time. Amongst other things were shown a large collection of the most modern apparatus by Mr. R. Konishi. A set of photographs, on porcelain, excellently reproduced. The Secretaries did not receive any note of the maker of these enamels, and would like to hear from him. A series of fine prints on gelatino-citro-chloride paper by Mr. G. Brinkworth, and an album of the Tokaido by Mr. K. Ogawa.

At 5 p. m. there was a meeting for the election of Officers, and for other formal business, Viscount Okabe, Vice President of the Secretary, in the chair.

The minutes of the last meeting having been read and approved, the Chairman called on the Secretaries to read their report for the past year, which they accordingly did.

The Officers for the past year having retired, it was proposed by Professor Kikuchi, that they be all re-elected, and they were re-elected accordingly.

It was proposed by Professor Kikuchi, seconded by Professor C. D. West, that Count T. Toda and Dr. E. Divers, F. R. S., etc., be elected Vice-Presidents of the Society. They were unanimously elected.

Mr. C. D. West then read a short paper on "A new toning process for silver prints." This process is simplicity itself. The prints must be on plain paper. They are printed in the usual way, are fixed, and are then thoroughly washed. After this they are dipped in a solution of sulphuretted hydrogen till they reach the tone wished for. Prints were shown that were of an excellent tone. Mr. West said that probably photographers would think that such prints were, of necessity, the reverse of permanent; but he saw no reason to think so. Sulphide of silver was really the most permanent silver salt he knew of. As a matter of fact he had failed to make any alteration on prints, either by dampness or by the action of light during one year.

After this paper was read, Prof. W. K. Burton exhibited the action of a very novel form of optical lantern that had been brought from America by Dr. A. B. de Guerville. This apparatus, although occupying little more room than an ordinary lime light lantern, distils its own oxygen and hydrogen-substitute as the exhibition goes on. Considering that the gear was in the hands of a lanternist of but slight expe-

rience, and that it was tried by him only for the fourth time, it worked with remarkable smoothness. The light was of extreme brilliancy, and the audience seemed to highly appreciate a set of scenes that were projected on the screen.

The proceedings terminated with a vote of thanks to the Chairman.

Behavior of Aluminum towards Mercury.—Helbig makes the following communication on this subject to the *Pharm. Centralhalle:*

If a little mercuric chloride (or other mercuric salt) is placed upon a piece of metallic aluminum, white, hair-like formations will at once be seen to rise from the surface. These grow during a short time considerably (several centimetres during about fifteen minutes). They are generally so fine that they can be blown away. To succeed with this experiment the aluminum must be at least moderately clean.

The reaction may be employed for purposes of amusement. A very handsome result is obtained if the recently-introduced aluminum penholders, having the form of bird's feathers, are coated with a strong solution of mercuric chloride. This will cause apparently additional feathers to grow out of the metallic one.

The reaction may also be used as an example of the inconsistency of the assumed law that bodies act upon each other only in a liquid condition, since the same phenomenon is observed, no matter what liquid is used for dissolving the mercuric salt. On the other hand, when dry mercuric chloride is applied to metallic aluminum, the formation of "hairs" occurs even more rapidly than when solutions are employed.

The nature of the reaction is this: First an aluminum amalgam is formed. Next the aluminum dissolved by the mercury is oxidized by the air and converted into alumina; this is shown by the fact that when a piece of aluminum is put in a solution of mercuric chloride, metallic mercury is separated. On the other hand, the "hairy" feathers are not formed if the reaction is attempted with exclusion of air.

He—"Had my photo taken at Sereno's the other day."

She—"Yes. I saw it."

He—"Ethel thought it rather insipid in expression."

She—"I don't know. I thought it very characteristic of you."
—*Harpers.*

The Editorial Dropshutter.

THE recent announcement of the Steinheil firm that they will fit to any good lens a negative element, which will transform it into a telephotographic lens, is suggestive. Many of our readers will find that they possess a variety of combinations in the lenses which they have at hand. The great difficulty is to know how to form these combinations. Many a boating trip might be enlivened by the addition of the eye-piece from an opera glass to the ordinary camera lens, enabling the operator to catch a distant sail or shore. But to adapt one lens to another in this manner requires either a tedious series of experiments or some knowledge of photographic optics. Photographic science does not stand alone as the science without drudgery. And we venture the assertion that those of our readers who find some time to devote to the study of the opticial properties of the lenses they are using will find the work thus spent gives only added keenness to the delight of their photographic recreations. Lenses, so far from being dry and dull, are filled with "points" of interest, and points upon which many an interesting discussion might focus.

We have bureaus for comparison of thermometers, bureaus for standardizing electrical instruments, and bureaus for the comparison of weights and measures.

Is there in America a demand for a bureau to which one can send a lens to be examined as regards its definition, distortion, focal length etc.,—indeed as regards any or all its optical properties and optical "constants"?

Such an establishment would naturally have its headquarters in some of our physical laboratories, such as the thermometric bureau at Yale or the department for comparison of electrical standards at the Johns Hopkins University.

An academic institution would make its charges merely nominal, and would guarantee freedom from commercial bias. From private information we have reason to think that such a bureau may be opened in the near future if there be such a demand.

Our columns are open for expression of opinion on this subject, from users and makers of lenses.

OUR esteemed Canadian contemporary in its number for June, publishes a paper on "Working Aristo" above the signature of A. E. Lyon. In the introduction we recognize page one hundred and forty-five of the AMERICAN JOURNAL OF PHOTOGRAPHY, taken almost verbatim, We do not object to the incorporation of our matter, but when a page is taken solid, it would be but courtesy to give due credit where it belongs.

Photographic Scissors and Paste.

A Cape May Episode.—"Little Willie, the kodak fiend," at Cape May, landed in a pot of trouble the other day through too promiscuous desire to secure a lasting impression of the many sights in view. All during bathing hour he wandered about the crowd gathered on the beach at the Congress bathing grounds. He would take a snap here and another one there. This tempting bit or that pretty shape would be gathered with a view of gloating over it some time in the future.

At last Willie came to grief. Upon one particular young woman he had had his eye for several days waiting anxiously for the time when she would venture in the surf. To-day he was overjoyed to catch sight of her on the beach. This was his chance, and he made all preparations to take advantage of it. However, he failed to notice the particularly stalwart escort. Willie had eyes only for the young woman, while the escort was keenly watching Willie. The latter's face told of his joy, he was brimful of smiles; he had a focus on the object of his admiration. Then a change came over the spirit of his dreams. There was a snap, but it was not like the ominous click of the kodak, it was more in the nature of a rattle. The stalwart escort had slipped up unseen, and his right duke landed on Willie's jaw bone. No arrests were made, and, for the time being at least, Willie is not in the photograph business.

The greatest refracting telescopes yet known are made by Alvan G. Clark, of Cambridgeport, Mass. So fine is the work required on the lenses of these instruments that the glassmakers commenced work on two disks, from which a 40-inch lens is to be made, four years ago, and only one has, as yet, been sent to Mr. Clark. If there is the most minute speck of any kind in the glass it is rejected. A disk 40 inches in diameter and 10 inches thick costs $8000. After Mr. Clark has determined what curve to give the glass, an iron casting is made of the size and shape required. The disk is revolved upon this and ground with steel crushings. Next, eight courses of emery and an adjustable tool are used, and at this stage measurements are made with an instrument that measures one thirty-thousandth of an inch. The final shape ing is made with beeswax and rouge, and even the bare thumb does its part in the polishing. The lens must be so exact in its curve that every ray striking it shall centre at a predetermined mathematical point.—*Public Opinion.*

The Amateur Photographers Get Together.—Thirty-six delegates representing twenty-one amateur photographers' clubs in various parts of the United States met at the rooms of the Society of Amateur Photographers of New York, 113 West Thirty-eight Street, on July 21st, and approved of the plan, and adopted a constitution and the name of the American League of Amateur Photographers.

The league is patterned in many respects after the league of American Wheelmen. It is established to bring about a closer union between camera societies, to promote the science and art of photography, to encourage and advance photography separate from its trade, commercial or professional relations, and to bring members into closer relationship in acquiring useful information.

A division will be organized in each State, and a national council will be held in May, 1893, to consist of three delegates and three alternates from each club. State divisions will appoint local officers in each town or centre, who will secure privileges and advantages, and furnish information to a member on presentation of his membership card. Arrangements will be made with hotels to furnish dark rooms and other conveniences for photographers. The league will publish a journal, and the new organization will take the place of the American Photographic Conference. It is proposed to secure to members a special discount in purchasing photographic materials. The membership dues will be one dollar yearly, and can be forwarded to the General Secretary, T. J. Burton, 113 W. Thirty-eighth St., New York.

Officers of the National Council were elected yesterday as follows:—President—Paul L. V. Thiery, Newark (N. J.) Camera Club; First Vice President—Dr. George L. Parmele, Camera Club of Hartford, Conn.; Second Vice President—Frances B. Johnson, Washington (D. C.) Camera Club; Treasurer—W. H. Drew, Lynn (Mass.) Camera Club; Secretary—T. J. Burton, Society of Amateur Photographers of New York.

The New York division of the league was organized at the Amateur Society's rooms last night, and these officers were elected:—President—Frank La Manna, Brooklyn Academy of Photography; First Vice President—Dr. Ely Van Der Walker, Syracuse Camera Club; Second Vice President—James H. Stebbins, Jr., New York Society of Amateur Photographers; Secretary-Treasurer—H. S. Fowler, Brooklyn Academy of Photography.

The earlier editions of the kodak now repose in pawn shop windows.

Literary and Business Notes.

"BECAUSE IT DIDN'T PAY."

He had traveled through Sahara, braved the dangers of the Nile,
Defeated enraged Mussulmen and dined on crocodile;
Knew everything of politics, religion, and the law,
Could box and fence and scull a race and please his mother-in-law—
In short, had all accomplishments of men both great and wise.
But he couldn't run a business, for he wouldn't advertise.

—*John R. Barrett.*

IN ARCTIC SEAS, OR THE VOYAGE OF THE KITE. By Robert N. Keely, Jr., M. D., and G. G. Davis, M. D. With map and illustrations. Philadelphia: Edward Stern & Co.

THE authors of this book are singularly fortunate in their choice of theme; they may also be congratulated upon their auspicious conduct of this narrative of the voyage of the "Kite" with the Peary Expedition to North Greenland.

The departure of the Kite with the relief expedition, which it is hoped will rescue the little band of explorers who were left to winter in the far north, has reawakened the interest developed by the departure of the original expedition. The circumstances relating to the journey were such as to excite a lively concern for the fate of the tiny party who were put ashore on the edge of McCormick Bay; for, apart from any consideration of personal feeling, it is obvious that Lieutenant and Mrs. Peary have done much to supply types of character closely associated with our national feeling and predilection.

"In Arctic Seas" is based upon the personal diary of Dr. Keely, Surgeon of the expedition sent by the Academy of Natural Science to accompany Lieutenant Peary, but much additional material has been incorporated.

The "narrative" reviews the whole journey of the Kite from the time she left her dock in Brooklyn to her return to St. John's, Newfoundland. The members of her crew had all the experience described by Arctic travelers, with scarcely any of their accompanying dangers. Ice-bound within two weeks of their departure, the gallant little ship forced its way through miles of ice to the "north water," as the sailors call it, and safely carried the explorers home again in little more than three months from the time they started, after reaching a point within a few miles of Kane's winter quarters, and but 600 miles from the pole. But one unfortunate incident is recorded, the breaking of Lieutenant Peary's leg while in the ice, and from first to last the voyage appears to have been an ideal holiday.

The book is printed on heavy paper and is illustrated both by photographs and pen sketches. Among the former are excellent portraits of Lieutenant and Mrs. Peary.

THE *Optical Magic Lantern Journal and Photographic Enlarger*, J. Hay Taylor, Editor, have removed their offices from Salisbury Square, E. C., to 55 and 56 Chancery Lane, W. C., London, to which address all communications should be addressed.

THERE is a moral dignity in minding one's own business to which you can attain. Solomon says that he who meddles with business not belonging to him is like him who taketh a dog by the ears; whereas he who pursues a contrary course is like him who sits down to a good meal with no one to make him afraid.

MRS. JOSEPHINE DIEBITSCH PEARY.

LIEUT. ROBERT E. PEARY, U.S.N.

BACK FROM THE ARCTIC SEAS.

AMERICAN JOURNAL

PHOTOGRAPHY

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JULIUS F. S[illegible]

Vol. XIII. [illegible]

SOME [illegible] IN [illegible]

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THE mounting of t[illegible] phot[illegible] which the operator w[illegible] good taste. Although [illegible] ical so[illegible] lations are concerned, it will [illegible] at aesth[illegible] also plays a very important pa[illegible] al resu[illegible]

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The [illegible] of a photographic print may be s[illegible] when [illegible] up to dry after the w[illegible] The [illegible] trim [illegible] print to its proper [illegible] is so cl[illegible] [illegible] actual mounting th[illegible] to say a word [illegible] it [illegible] further, but I am not writing this for th[illegible] who [illegible] by business considerations to cut the prints a[illegible] alike [illegible] and mount them upon cards of a regulation size. [illegible] in the interest of a very numerous class of phot[illegible] [illegible] and amateur who handle negatives [illegible] and who desire to trim the prints so as to give [illegible] effective appearance when finally mounted [illegible]

MRS. JOSEPHINE DIEBITSCH PEARY.

LIEUT. ROBERT E. PEARY, U. S. N.

BACK FROM THE ARCTIC SEAS.

AMERICAN JOURNAL
OF
PHOTOGRAPHY

THOS. H. McCOLLIN, Managing Editor.
JULIUS F. SACHSE, Editor. XANTHUS SMITH, Associate Editor.

VOL. XIII. OCTOBER, 1892. No. 154.

SOME POINTS IN PRINT MOUNTING.

BY ELLERSLIE WALLACE.

THE mounting of the finished photograph is something in which the operator will find every opportunity of showing his good taste. Although strictly mechanical so far as the manipulations are concerned, it will be found that æsthetic consideration, also plays a very important part in the final result.

To paste a print neatly on a piece of cardboard is no very difficult matter. It is true however that some persons whose "fingers are all thumbs" have trouble in learning how to spread the mountant evenly and at the same time to keep the print firmly in place so that the edges and corners shall not curl up and touch the brush. Persons also who may be quite expert in other kinds of pasting where the papers have no curl in them, will find albumen prints much more refractory, and probably have an apprenticeship to serve before they can trust themselves to handle a lot of valuable prints.

The making of a photographic print may be said to terminate when it is hung up to dry after the washing. The operation of trimming the print to its proper shape and size is so closely connected with the actual mounting that I wish to say a word about it before proceeding further, but I am not writing this for those who are compelled by business considerations to cut the prints all alike in a machine and mount them upon cards of a regulation size. I write rather in the interest of a very numerous class of photographers, both professional and amateur, who handle negatives of varying sizes, and who desire to trim the prints so as to give them the most effective appearance when finally mounted.

Three things are necessary for trimming prints. First, a large piece of flat glass—preferably plate; secondly, a glass shape to cut the prints by, and thirdly, a knife with a well-tempered blade, not too springy and tolerably sharp. The glass shape, of course, should be as nearly as possible the desired size of the trimmed print, but this is not absolutely necessary, if only it be ground strictly rectangular. A box with a little cotton in it should be provided, into which the glass shape should be carefully laid after work is done, for even the slighest nick in the edge or on the corners will unfit that side for use. Accurate trimming will depend upon the perfect flatness of the two glass surfaces; it will be found that if one or other of them is irregular, even the heaviest pressure the left hand can bring to bear upon the shape will not hold the edges of the print tightly, and the knife will then tear large notches in the paper instead of cutting.

It might seem absurd to advise anyone who is about to mount a lot of prints to see that they are properly trimmed first; but I have repeatedly seen persons who had returned from travelling with large collections of unmounted prints make every preparation for mounting them, either in elegant albums or on loose cards, and never think to look at the corners to see that they were square. The most convenient way of opening the prints (which are generally curled, up) is to lay them under the large flat glass upon which they are afterwards trimmed. In doing this, care must be taken not to turn down a corner. If the prints are very much curled, apply the edge of a table ruler to the back of each print, holding the thumb on the face, and by gently pulling work the curl out. It almost goes without saying that the fingers must be clean before commencing this operation, which is by no means a safe one to perform with such prints as are made on highly glossed paper; the albumen surface cracking under the the strain. In such cases I should prefer to lay them in a pan containing a quart of water, with from one to two ounces of pure glycerine, and after they become fully saturated, to remove and dry them between folds of clean white blotting paper.

Before leaving this part of my subject, I wish to advise all printers to hang their finished prints up to dry in pairs back to back;

bringing them together under the water, lifting them and draining them a moment, and then supporting them by the two upper corners by spring-clips strung on a long wire crossing the room. The prints when dry will be perfectly flat and require no straightening.

To soak a print off its mount is sometimes a most difficult matter. If it does not give way of itself after a couple of hours soaking in plain cold water, water lukewarm may be tried; it should never be hot, for the tone of the print will always be reddened. If the print requires trimming, this should be done on the original card before wetting. If a print refuses to leave the mount, it might be possible to succeed by squeegeeing the face of the print to glass, and then carefully working the old mount off in bits at a time with the finger-nail, followed with a gentle friction with a soft tooth-brush. Prints that have simply been rolled (not burnished) after mounting with a plain starch mountant, would come off easily, while those mounted with gelatine and waxed with an encaustic paste after the rolling, would probably never give way. Soaking off and remounting points is generally an unsatisfactory operation. If the print possesses any value, I should prefer to enclose it in a mat or passe-partout made to fit, rather than attempt to remount, particularly as the process of fading, if once started, would not be checked by the substitution of a fresh cardboard, and the print would thus be risked to no purpose.

It sometimes happens that stereoscopic views are reversed in the mounting. In such a case, trim each side (card and all) neatly down to the size of the print, and remount them in proper position on another card with rather thick glue containing a little chrome-alum. Pass the picture through a rolling press (not a burnisher) half an hour or an hour before mounting.

A short distance back I said that the printing might be considered finished when the prints are hung up to dry. But if a number of mounted prints collected from various makers be examined, it will be found that while some have the natural surface, others have been rolled, and others again passed through the burnisher. Now, while these finishing processes give the prints a beautiful brilliancy, they are really drawbacks so far as

the mounting is concerned. Not so much because the fine surface will disappear when the print is moistened, as because the fibre of the paper is more or less crushed in the process of rolling, and the mountant will "strike in" unequally, leaving ugly mottled spots when dry that cannot be removed. By holding each print up before a strong light it is easy to tell whether it has been rolled or not; the translucent patches, together with the abnormally smooth surface, prove that it has been through the press. A burnished print may show only the smooth, soapy surface which is dulled by a moment's contact with a damp finger. This is never the case with the rolled print. The safest plan to pursue in mounting prints that have been burnished or rolled is to apply the mountant, made specially thick for the purpose, to the extreme edges of the print only. A convenient way to effect this is to cut a stiff card one-third of an inch smaller each way than the print, and laying it down on the back quickly run around the edges with the brush.

I should never blame a printer for rolling unmounted prints so as to increase their good looks; but in making up albums of views or specimens, for instance, it will greatly increase the trouble and risk of mounting. It is possible to roll prints enough to give them a fine surface, that will remain in great degree after mounting, without incurring danger of the mottled spots just alluded to, but much care and skill are required. To one wanting the best surface for his prints in albums, I should give the advice to procure fine, very thin cardboard, and, having mounted and rolled the prints afterwards in the ordinary way, to paste them together in pairs back to back, so that each pair formed a leaf. Allowance should be made for the extra inch which the binder cuts off at one end to form the "guard" that inserts into the back of the album. The prints of course should be kept flattened under heavy pressure throughout the operation, until after binding. When albums are made up in this way, the binder should be instructed to insert a fly-leaf of good paper between each pair of leaves, so as to keep the prints from chafing, and not to trim the cards in the cutter more than is absolutely necessary. If the names of the photographs are to be written in by hand, it should

be deferred until the very last; if done before binding the chances are that each title will be about half trimmed away in the cutter.

Trouble of this sort is not met with when prints are mounted in ready-made albums. The surfaces of the prints, however, can never be so brilliant.

Our photographic journals have published thousands of recipes for mountants. After many years' practice in photography, and close watching of the behavior of prints mounted with different substances, I feel perfectly safe in recommending simply starch well boiled in preference to anything else. I have been greatly disappointed in the permanency of prints mounted with gelatine in any manner, either upon cards or upon glass. I went into this subject in detail in a paper read before the Photographic Society of Philadelphia in the early part of the year; and I may add that my opinion regarding the unreliability of gelatine as a mountant is sustained by some of the best operators in the city. Solutions of gelatine in alcohol are elegant preparations for mounting, and work very smoothly under the brush; they are most convenient also for the scrap-album purposes before spoken of, and in fact their only drawback is the very serious one of affecting the permanency of the print. Mountants containing glycerine (which is used to modify the extreme hardness of gelatine alone) are even more to be feared, from the fact that glycerine always attracts water, and is sure to retain any dampness present in the print even if the latter is seemingly quite dry. My own photographic collection of more than twenty-five years standing, and the experience of many of my friends, justify me in making the above condemnatory remarks upon a substance which is still largely used for mounting silver prints.

"**How** do you understand the phrase an 'impressionist picture?'" asked the country cousin of a city cynic as they stood in the art gallery. "Why, an 'impressionist picture' is one that leaves on your mind the impression that it is the picture of a cow, and the impression lingers until you look into the catalogue and read that it is the picture of a water spaniel."

SOLIO PAPER.

THE novelty of the month is a new printing out paper, put on the market by the Eastman Kodak Company of Rochester, N. Y., under the trade name of "Solio" Paper. The manufacturers announce that the paper was only put on the market after an extended series of experiments and a thorough trial, not only in their own printing department, but by leading photographers. It is claimed that the support is entirely free from injurious defects, and arrangements have been entered into for a continuous supply of the paper which will tend to obviate the vexatious delays so annoying to the profession.

The Company have issued the following directions for using the new paper:

Print in direct sunlight, covering thin negatives with tissue paper, allowing the print to get a little darker tint than the finished print should be. Place print without previous washing into the following:

COMBINED TONING AND FIXING BATH.

Stock Solution:

A.	Hyposulphite of Soda,	8 oz.
	Alum (common)	6 oz.
	Water,	80 oz.

When dissolved add 2 oz. borax dissolved in 8 oz. hot water. Let stand over night and decant clear liquid.

B.	Chloride of Gold,	15 grains.
	Acetate of Lead (Sugar of Lead),	64 grains.
	Water,	8 oz.

To tone 30 cabinets take

Stock Solution A,	8 oz.
Stock Solution B,	1 oz.

Tone to desired color, and immerse prints for 5 minutes in following Salt Solution to stop the toning:

Salt,	1 oz.
Water,	32 oz.

Wash 1 hour in running water or in 16 changes of cold water, when prints may be mounted same as albumen prints.

If prints are not to be mounted they should be squeegeed on ferrotype plates to give a glacé or ground glass to give a mat finish.

All solutions should be used as cold as possible.

In warm weather prints should not stand over night before mounting.

Mounted prints must be thoroughly dry before burnishing.

THE DANGER OF CHEAPENING ART.

BY XANTHUS SMITH.

WITH the ready means furnished by the various photographic reproduction processes now in use, there is a decided danger of an over-flooding of the community with bad art. Art for art's sake, that is, for its excellence, is a sentiment that ought to be ranked very high, and in order that art may legitimately fulfil its mission, it should be respected and upheld in so far as it is possible for it to be considering the varying tastes and requirements of the times.

Mere portrayal is not art, and should not be allowed to have any pretensions as such, though, we are sorry to say, that with so many as there are at present dabbling in art, and endeavoring to lay claim to more or less rank as artists, there is a constant tendency to a breaking down of the barrier which should exist between true art and the mere mechanical or unfeeling representation of any commonplace thing.

Any production to be a true work of art must, of course, be largely the production or emanation of an artistic mind. It should be the refined embodiment of many natural perfections or beauties. In fact, art consists in selection, arrangement, and emphasis.

All those who have a proper knowledge of art admit the perfection of the ancient Greeks in their sculptures of the human fig-

ure, and in how few instances their work has been rivaled in modern times, and as an insight to their mode of study, we are told of the fact of the great artist Praxiteles employing a number of models in making his studies for his celebrated Venus, although it is admitted that the Greeks were a very perfectly formed people, and it might be supposed that to have selected one perfectly formed individual, and copied nature exactly, would have given a sufficiently perfect result.

When we descend from Greek art and come into the lesser walks, we are not released, as it might be supposed we would be, from this exercise of the art faculty. If we would produce work of excellence, worthy to command respect, we must exercise mind and talent in what we do, and, therefore, no work of a mere machine can be ranked beyond its true level, being always, of course, to the greatest extent mechanical, and possessing merit only to the degree of its capabilities, beyond which any superior genius posessed by the operator cannot wield it.

Photography, we feel, may fairly be ranked much higher as a means of art portrayal than any of the simple mechanical processes, because it is not solely a mechanical process, but largely nature's work, and just in so far as it is nature's work, so far does it give us those refined qualities which constitute its greatest beauties and merits.

We all know that the curious working of nature in producing the photographic image is a mystery. There is yet an unknown link in the chain of operations and results. The sensitive film is impressed, but how we do not know. Exactly what takes place in exposing the sensitized film, that in after development causes the silver deposit, so subtile and so refined, upon certain portions just in the degree of force with which the rays of light have touched it, we are simply guessing at, and, therefore, we cannot call photography in its perfection entirely man's work as yet. We must yield, we feel, that superiority which all nature's work possesses.

Unfortunately we cannot say as much of any of the printing processes. They are all so far mechanical as to destroy those refinements and graces which lift such work into art. Of course

we refer to press work in our use of the word printing, and not to photographic printing from negatives. At their very best the majority of photo-mechanical prints are only tolerable, and when of a quality anything beneath the best, they are utterly intolerable to persons of good taste.

When we see, as we do now, such a profuse illustration o books, magazines, and pamphlets with bad reproductions of works of art and photographs, we cannot help regretting that so much time and means should be thrown away in the production of such work, and feeling that a much less amount of art and of a superior quality would really be a relief to the community and a benefit to it.

It matters not whether the original drawings, engravings, or photographs reproduced were good or bad, they are all reduced to the same level in the miserable flat smears that we get of them in the majority of the reproductions.

There is, we fear, a danger of a general debasement of public taste by having constantly put before it such crude and unrefined work.

Every one knows how completely chromo-lithography has been thrown into disrepute by a wholesale dissemination of excessively bad art work. Chromo-lithography has its excellences. The writer derives much gratification now from good art of this kind, and had care been exercised to respect this branch of art sufficiently to keep it up to a certain standard of excellence, thereby also reducing the quantity, we would not now find the whole cast under the stigma of "the vulgar chromo," and almost entirely debarred from a place in the genteel circle.

The truth is that cheapness does its work of destruction in this direction as in most others. It was the cheapening of the chromo that brought its downfall. What person of good taste can look upon any of the prolific auction daubs by which the art of painting is based, without a feeling akin to disgust; and are we not in the same danger with the photograph?

Certain processes there are which give us very pleasing and in every way satisfactory results in the art of photo-reproduction, because they require not only more painstaking care, but also

more skill, more brains, in fact, than the inferior ones, all of which must be paid for.

We will conclude by asking, would it not be better that we should have a few excellent embellishments in a book or a journal than a host of miserable mongrel productions such as we now see so largely palmed off as illustrations?

For our part, we should say, rather give us a few choice things that we might constantly refer to with pleasure, than a host of trash to be cast aside after the first view.

PHOTOGRAPHIC SEARCH FOR A PLANET BEYOND THE ORBIT OF NEPTUNE.

ISAAC ROBERTS, F. R. S.

THE hypothesis that one or more planets exist beyond the orbit of *Neptune* has been long entertained by astronomers, and Professor Forbes, in a remarkable paper on "Comets and ultra-Neptunian Planets," which he read before the Royal Society of Edinburgh at the beginning of the year 1880, predicted with considerable confidence that one or two such planets exist, and in the paper referred to he gave very fully his reasons.

The prediction was based upon the recorded positions of the aphelia of a number of comets. He said, "That there could be no longer a doubt but that two planets revolve in orbits external to that of *Neptune*, one about 100 times, the other about 300 times the distance of the Earth from the Sun."

In 1887, November, I wrote to Professor Forbes to ask him if he had further considered the hypothesis concerning the supposed planets, and that I was prepared to make a search for them by photographic methods. In his reply he stated that the present position of one of the hypothetical planets is 11h. 48m. R. A. and 3° N. Declination, and he believed that a range of 5° each way in R. A. and of 2° or 3° in Declination ought to find the planet if it is there. The motion of the planet he computed at one degreein 2.96 years.

I thereupon commenced the search, but soon found that the climate of Maghull was so unfavorable for celestial photographic work of this character that my task was nearly hopeless; but since the removal of my Observatory to Crowborough I resumed the search under conditions sufficiently favorable to complete the work, which was conducted on the following plan:

A chart was made of the region indicated by Professor Forbes between R. A. 11h. 24m. and R. A. 12h. 12m., with Declination 0° 0′ to 6° 0′ North. This region was covered by eighteen photographic plates, each of more than four square degrees in area, and allowed of sufficient overlap to show a number of the same stars on two or more contiguous plates. Two sets of photo-plates of the region were taken with an interval of not less than seven days between exposures, which were of ninety minutes duration, and the dual photographs were subsequently compared three times over by superposition, in order to see if any star appeared on one plate which was not on the other, or to see if change in the position of any star had taken place in the interval between the dual exposures. In this way the whole of the plates covering the region were very carefully examined, and it now only remains for me to report that no planet of greater brightness than a star of the 15th magnitude exists on the sky area herein indicated, nor is there on the plates any abnormal appearance to which it is necessary here to draw special attention. It is a region where the stars are not exceptionally numerous, and they are mostly faint.—*Monthly Notices, May, 1892.*

NEW TONING BATH FOR CHLORIDE PAPER.

BY WALTER D. WELFORD.

THE fact that all photographic papers have missed the principal points of the new toning bath for chloride paper, which I introduced to the London and Provincial Association on August 11th, leads me to write this note. For the mere sake of a new formula, I should not have devoted so much time and care, nor should I have taken up the time of any Society. In the

published reports of the meeting a feature is made of the formula itself, but little, if anything, said as to its advantages. It is in these latter that the merit lies.

I will first detail my experiments. Those who have worked years ago with prints from wet-plate negatives will remember the simple bicarbonate of soda toning bath, and the somewhat washy nature of the results, which made it useful for very brilliant prints, but not suitable for others. A slight bleaching action takes place, which was in turn an advantage and a nuisance.

Remembering this, I tried the old formula upon the new Eastman paper, but found no gain in any way until the strength of the bath was increased. I claim nothing for the use of bicarbonate of soda in the toning, but I do claim to have introduced a bath for chloride prints that possesses several valuable points, which are as follows:

1. The bath is made at time of use.
2. It is simplicity itself.
3. It tones the prints quicker than any other.
4. The unevenness of toning, which is usually the bugbear of chloride prints, is absolutely annihilated.
5. It gives a pleasing gray-black tone resembling platinotype.
6. Over-toning is impossible.

The prints are completely toned in one and a-half to two minutes. The tray need not be removed at all, and if six prints are immersed, it takes all the operator's time to keep them going. As fast as he can get them out of the tray, he can insert a fresh print.

Uneven or partial toning is really one of the strongest points, because, as a matter of fact, unless the prints show some trace of this, I get suspicious. I can completely tone half of a print first, then the other half, and no dividing line is apparent. A dozen air-bubbles or streaks can be left on the print, with the result of a dozen bright red spots upon the otherwise finished print; and yet, if these be covered over and the toning continued, there is no trace whatever when finished. The fact is—and here lies the merit of the whole thing—a definite tone being obtained, no amount of immersion in the solution (within reason of course)

will alter that tone, so that in the case of red spots they nearly catch up to the other part. This is very apparent if a print be toned, say, in four sections, as it is impossible to show the four degrees, the second one toning to the level of the first before the third can get a start.

As regards over-toning, I have left the prints an hour without any difference between them and those taken out in two minutes.

I claim that this bath makes the chloride paper easier and quicker to finish than any other silver paper, and it will even bear favorable comparison with any method of printing and finishing at present in use:

The bath is as follows:

Gold, - - - -	4 grs.
Bi-carbonate of Soda, - -	1½ drs.
Water, - - - -	6 oz.

It will be noticed that, compared with the usual baths, it is exceedingly strong. I claim that, in conjunction with the use of bicarbonate of soda, as the feature of it. I see in an American paper that bicarbonate of soda is recommended, and in England borax is mentioned. But neither of these use such a strong bath. As a point of comparison, let me place the two baths together.

Gold, - - - -	4 grains.
Bicarbonate of Soda, - -	90 grains.
Water, - - - -	6 ounces.

Usual Carbonate Bath.

Gold, - - - -	4 grains.
Bicarbonate of soda, - -	16 grains.
Water, - - -	32 ounces.

It is evident, therefore, that I have done more than merely recommend the usual and old bicarbonate bath.

The prints need washing before toning, a slight rinse afterwards, and final fixing in a weak solution of hypo (say 1 to 6) for about ten minutes. Over-printing is necessary to allow for the bleaching and reducing action, but the actual tone of the print does not change at any period of the fixing. The prints must be judged by looking through to a strong light. As soon

as the last trace of red or brown has gone, it is finished. For those who prefer a warmer tone and slower action, it is only necessary to double the quantity of water, and rock the tray.

My own opinion—doubtless an egotistical one—is that this bath will do much to popularize the use of gelatino-chloride papers; because, although the manufacturers declare that a child can tone their paper, and that if a photographer cannot he is a muff, yet I am certain that many have found difficulties in toning, which all those who have worked with the above bath declare to have completely vanished.

In conclusion, let me say that the bath is applicable to at least seven or eight kinds of chloride paper, but as it appeared to work best with that issued by the Eastman Company, I demonstrated the bath before Mr. Walker, and placed it unreservedly in the hands of the Company, who will adopt it if the tests they make be satisfactory.

I apologise for the length of this communication, but I am anxious that this matter should be placed correctly before the photographic world.—*Photographic Work.*

Mounting Paste for Lantern Slides.—For attaching lantern slide bindings to the glass nothing is better than bichromated paste, which is used for attaching paper to glass in the manufacture of electric instruments, and which is a most useful paste for many purposes in damp climates. It is made as follows:

Flour	2 teaspoonfuls.
Water	4 ounces.
Bichromate of potash	5 grains.

The flour must be rubbed to a smooth paste with the water, then placed in a saucepan over the fire and kept stirred until it boils. Add the bichromate slowly, stirring all the time; then stand to cool.

This paste must be kept in the dark, and used as soon as possible. Soak the paper in it, and attach to the glass, then place in direct sunlight for a day. This sets up a chemical change in the bichromate, and renders the paste insoluble.—*Journal of the Photographic Society of Japan.*

AN IMPROVED METHOD OF PHOTO-ETCHING ON ZINC AND COPPER.

THE object of a recent British invention is to produce, by means of photo-etching on zinc and copper, plates suitable for producing in half-tone the highest class of printed work, such plates being prepared, ready for printing from, in less time and at smaller cost than any plates of whatever description now used for printing from.

According to the method, a tin-plate of suitable size and shape is taken and covered with a coat of lamp-black, and when this is dry the manipulator coats over the lamp-black with Chinese white, and thoroughly dries the plate. He then, by means of an ordinary ruling-machine, rules on the prepared plate, through the white only, diagonal, horizontal, vertical or crossed, straight, waved or jagged lines. This operation leaves the plate showing black lines on a white ground. He then throws an enlarged image of the picture or design to be printed on the ruled plate by means of a magic-lantern. He takes a negative of the dimensions of the finished print by means of a photographic camera in the usual way, from the picture or design as thrown on the tin-plate by a magic-lantern, and prints from such negative on the zinc or copper plate, which has been previously sensitized with bitumen, and develops the picture on the zinc or copper by the aid of turpentine, in the usual way. If the plate used is of zinc, he next immerses it for about thirty-five minutes in a bath of three parts nitric acid and twenty parts water by measure. When removed from the bath, he sponges off all the acidulated water with a solution of gum-arabic and water. The deep shadows will now be well visible. He next immerses the plate for about five minutes in a saturated solution of carbonate of soda, and then places it under running water for a short time, and lightly rubs it with a soft rag or brush, for the purpose of cleaning the picture from any deposit of nitrate of zinc. When the plate is sufficiently washed, he inks it with ordinary printer's ink, and dusts it well with powdered resin. The loose powder is blown off, and the plate again immersed in the acid bath, and,

after allowing it to remain therein for about an hour, he removes it therefrom, and washes it well with oil of turpentine. He next inks the plate with etching-ink, composed of equal parts of paraffine wax, tallow, and printer's ink, and replaces it in the etching-bath for about thirty-five minutes.

To accelerate the etching process, he may add to the bath for the two last etchings, a little at a time, a small quantity of both sulphuric and hydrochloric acids, the quantity to be in proportion to the hardness of the plate. When sufficiently etched, the plate is mounted on wood, and is then ready for printing from. If the plate to be prepared for printing from consists of copper instead of zinc, for the first two etchings substitute for the nitric acid an equal quantity of a saturated solution of perchloride of iron in the etching bath above described, the bath for the third etching being the same as hereintofore described for zinc plates. Or, instead of photographing an enlarged picture onto the ruled plate, as hereinbefore described, a photographic negative may be taken direct from the picture drawing or object to be produced, and another negative (wet plate) from the ruled plate. These negatives place in a magic-lantern, with the negative from the ruled plate in front, and throw the combined image from both negatives for a sufficient time direct on to the zinc or copper plate, which has previously been sensitized with bitumen. After the picture has been developed on the plate by turpentine, the plate is then etched and prepared as hereinbefore described. This process is also suitable for preparing zinc or copper matrices for making India-rubber stamps, and for engraving zinc or copper seals or dies in intaglio or relief, but when engraving in relief is required, a positive photograph must be used instead of a negative.—*Paper and Press.*

Mr. T. C. Hepworth has been giving a series of lantern exhibitions at the Crystal Palace, using a specially-devised form of electric lantern. An experiment was tried of illuminating the screen by lime-light, and then on the disc thus formed a slide was projected by the electric light, when even the finest details of the picture were seen with distinctness.

EARLY DAGUERREOTYPE DAYS.—V.

AN HISTORICAL RETROSPECT.

BY JULIUS F. SACHSE.

(*Continued from page 410.*)

LEVITSKY, who saw this effort,[11] describes it as a small plate, six by eight-and-a-half c.m., which showed all the characteristics of a first effort. The silver plate had been fumed with chlorine and iodine. It represented the full figure of the king, seated in a reclining-chair.

The application of bromine as an accelerator was not used in Paris until June 10th, 1841, when it became known to Claudet.[12]

Strange as it may appear, photographic portraiture was not a success in Paris until the advent of an American in 1845, viz.: Warren Thompson, of New York. Thompson came to Paris without being able to speak a single word of French. He merely had a letter of introduction from the Russian consul in New York to the vice-consul, Iwanow, in Paris. The latter turned the American over to Levitzky, who received him cavalierly, supposing him to be a mere amateur. He was soon disabused when Thompson produced his specimens. They proved far better than anything which had so far been seen in Europe. Neither Paris, Vienna, nor Rome could produce such results. Levitzky, then one of the leading daguerreotype artists in Paris, writes: "They were not mere daguerreotypes, they were works of art."[13] Here was strength, relief, artistic lighting, softness of shadows, with a wealth of half-tones. All specimens were on half-plates. This in itself was a revelation, as thus far in Paris nothing larger than quarter-plates had been used.

Thompson at once opened a studio in a large building in Boulevard Poissonier, Maison du pont de fer. The studio contained two stories, with three large rooms, having large windows. So superior were Thompson's results, that, notwithstanding the

[12] Humphrey, Vol. XII., p. 109.
[13] *Photographische Zeitung*, Vol. XVI., p. 221.

competition of native operators, his sitters averaged from thirty to forty per day.

Levitzky himself returned to Russia, and became one of the pioneer photographers in his native city of St. Petersburg. His studio is in the Newsky Prospect, opposite the Kasan Cathedral.

After Dr. P. B. Goddard's bromine process became known, through the publication of the process in the magazine of the American Philosophical Society, professional portraiture spread over the whole civilized world with great rapidity.

THE DEVELOPMENT OF HELIOGRAPHY.

As the years 1840 and 1841 progressed, and the splendid results obtained by Cornelius and others in Philadelphia became known, the Daguerre process received an impetus which spread its capabilities for portraiture and practical work not only among scientists, but with the public at large, but owing to a lack of knowledge of the Philadelphia accelerating agents it was slow in coming into practical use.

It is true that attempts were made to open establishments for portraiture in different cities in the hope of making the new process a source of profit similar to Morse's and Walcott's ventures in New York. These, however, were all crude establishments, patronized mostly by persons who were impelled by curiosity, more to see the process than with the expectation of obtaining a lasting portrait.

In the early days of photography one of the chief points made against the new process, both at home and abroad, was the charge that the results were not permanent,—a feature which, it was charged, would prove the great obstacle to the practical use of Daguerre's photogenic process, as the images were of so delicate a nature, and so easily injured, that the slightest touch would efface them. This apparent deficiency in Daguerre's process was strongly dwelt upon in an article in the *Mechanic's Register*, of London, early in the year 1840. Daguerre himself suggested that if only a varnish could be found which might easily be applied to the surface of the plate after the completion of the

picture, which would protect them from injury without impairing their delicacy, it would undoubtedly add considerable value to his discovery.

Not long after these comments appeared in the scientific journals, the eminent French chemist, M. Jean Baptiste Dumas, announced [1] that he had discovered a varnish which would have the desired effect of protecting the developed image. This consisted of a liquid compound of

Dextrine, - - - -	1 part.
Water, - - - -	5 parts.

This mixture—the first preservative on record—seemed well adapted for the purpose, and continued in use until Fizeau's method of fixing became known early in 1842. This consisted in coating the plate with a solution of chloride of gold, and then drying it by means of the flame of a spirit lamp.

This discovery of a simple process solved the question of a fixing agent, and, together with Dr. Goddard's application of bromide, paved the way for the extension of the photographic process throughout the civilized world.

THE FIRST PHOTO-MECHANICAL REPRODUCTION.

The most important event to be chronicled for the year 1841 is the first application of Daguerre's process to the production of ordinary printing plates. Here again the honor belongs to one of Philadelphia's scientists, viz.: Joseph Saxton, the same who made the first heliograph in America; and it is a noteworthy fact that the impressions from this plate made half a century ago have never been surpassed for softness and beauty of finish.

The causes which led to its production were as follows: During the year 1841 Jacob R. Eckfeldt and William E. DuBois, assayers of the United States Mint, prepared a manual of "Gold and Silver Coins of all Nations, illustrated by numerous engravings of coins, all executed by the medal ruling machine, invented by Joseph Saxton."

[1] Journal Franklin Institute, Vol. xxv., p. 142.

As the work neared completion it was suggested to have a picture of the Mint as an illustration or frontispiece. As there were neither steel nor copper plates of the subject it was determined to make one which would be in harmony with the rest of the work. How this was accomplished the following quotation from the book in question will show, viz.:

"To obtain the vignette of the Mint (which is on the title page), as there was no medallion to rule from it was required to go back to the original, and this necessity brought into play another brilliant invention of modern times, the *daguerreotype.* A picture of this edifice was taken with this instrument by Mr. Saxton, from which a copy was engraved in soft metal by Mr. Gobrecht; from this copy a counterpart was obtained in copper by the electrotype, and therefrom the engraving was effected. This view is therefore commended to the reader, not only as a faithful and beautiful transcript of the original, but as combining in its production three discoveries which adorn the present age, the *daguerreotype, electrotype,* and *machine-engraving.*"—(Manual of Gold and Silver Coins, Philadelphia, 1842, p. 189.)

PROFESSIONAL STUDIOS.

The advent of the year 1842 marked the opening of strictly professional galleries for Daguerrean portraiture as a commercial venture in several of the leading cities in the Union, these were under the control of John Plumb, Jr., who placed them under the supervision of employés as soon as established. Plumb's first gallery in Philadelphia was opened at 173 Chestnut Street, now 505, three doors above Fifth Street on the north side, opposite Independence Hall. Here he continued for three years, until Samuel Van Loan opened a similar establishment at No. 140 Chestnut Street (south-east corner of Fifth Street). Plumb then removed his gallery to No. 136, two doors above the Custom House.

To John Plumb, Jr., probably belongs the questionable honor of being the first to debase heliography, and attempt to monopolize Daguerrean portraiture in this country, and thereby drag the art into the rut of ordinary competitive trade. In the establishment of his various gallaries he seems to have had no interest in the advancement of the art. His only object was to turn out

cheap goods, quality or artistic effect being of secondary consideration, similar to the peregrinating tintype artist of the present day.

The results of Plumb's schemes were but natural; men in the different cities, who had the interest of the art in their minds, soon broke down the daguerreotype monopoly sought for by Plumb.

With the slow and uncertain methods of communication at that day Plumb of necessity was forced to neglect some of his ventures. The consequence was that in less than four years the would-be daguerreotype monopolist became reduced, through the heedlessness and wastefulness, if not absolute dishonesty, of his agents, so that from being possessed of a competency the year 1847 found him literally penniless, with most of his fine establishments passed into the hands of those in whom he had confidently trusted.[2]

MOSER'S "INVISIBLE LIGHT."

A curious episode of the year 1842 was the publication of Moser's experiments,[3] proving, as it were, the existence of invisible photographic rays. Moser himself used the paradoxical term "invisible light."[4]

Moser's claims were that:—

(1) All bodies radiate light even in the dark.

(2) The light does not appear to be allied to phosphorescence, for there is no difference perceived whether the bodies have been kept long in the dark, or whether they have been just exposed to daylight or to direct solar light.

(3) Two bodies constantly impress their images on each other, even in complete darkness.

(4) However, in order that the image be appreciable, it is necessary, on account of the divergence of the rays, that the distance of the bodies should not be very considerable.

[2] Root, "History of Heliographic Art."
[3] Journal of Academy of Sciences, Paris.
[4] Eder. Handbuch der Photographie, 2d edition, Vol. I., pp. 149, 182, 187.

(5) To render the image visible, the vapor of water, mercury, iodine, etc., may be used.

(6) There exists latent light as well as latent heat, the former of which radiates in accordance with the law of inverse squares.

This announcement from the Königsberg scientist caused great surprise both in Europe and America, and the American Philosophical Society of Philadelphia at once instituted a series of investigations, which were brought before the Society at one of the series of special meetings which formed part of the great Centennial festival of that institution.

It was at the meeting held May 30th, 1843, that the fallacy of Moser's theory was proved by Joseph Saxton.[5]

At this meeting Dr. Paul Beck Goddard called attention to the experiments of Moser, by which he claimed to prove the existence of invisible photographic rays.

He said that in repeating the experiments with much care, he had failed to obtain an image. This failure he ascribed to the fact that before attempting the supposed photographic process, he had made the cameo or coin which was to produce the image, and the plate on which it was to be received, *perfectly clean.*

On mentioning the circumstance to Mr. Joseph Saxton, of the United States Mint, whose expertness in experimenting was well known to the members of the Society, he learned that numerous and careful trials had proved to his satisfaction that the effect

[5] In view of the resurrection of this fallacious theory at regular intervals, since it was incorporated by Robert Hunt in his "Photography" (2d edition, 1853, p. 170), the whole of the proceedings before the American Philosophical Society are reprinted. Strange as it may seem, within the past few months, June 24th, 1892, this subject was the leading theme of discussion at the Physical Society of London. The final view at this meeting was one touched on by Professor Sylvanus Thompson, wherein he states:

"For all we know, many objects may be glowing with electrical oscillation, and, indeed, there may be a world of light and color, opacity and transparency, totally closed to our senses,—a world of force and energy making such communications between persons and things as are altogether beyond our conception. Indeed, we must not loose sight of the fact that the wide range of oscillatory force, of which light is a small section, is, for the greater part, closed to human senses and perception."—*Photographic Work.*

An American contemporary, no doubt stimulated by the above, republishes Hunt's translation of Moser's theory, with the editorial comment that "until now the phenomena related in these articles have not received any practical application, but we [*i. e.*, the editorial staff] think it possible to utilize some of them in the processes of industrial photography.

remarked by Moser was due to the evaporation of some greasy substance from the surface of the object forming the image, and that when this had been first carefully removed, no image was obtained.

This had recalled to Dr. Goddard's mind an observation which he made some years ago, while prosecuting a series of experiments on the daguerreotype. He had wrapped some highly-polished plates in a very old newspaper for the night, and found in the morning that the outer plates had received a perfectly distinct image of the printing that had been in contact with them. Thinking that this was owing to the contact, he enclosed some similar plates in very fine and clean tissue paper, and wrapped the newspaper over this; but the impression appeared in the morning as before, the oil having traversed the tissue paper. This led him to the precaution of employing tin boxes to keep the plates in when made ready for the daguerreotype process.

Dr. Goddard concluded by expressing his entire concurrence in the opinion of Mr. Saxton, that the effects observed by Moser were due to the evaporation of oily or other organic substances which had accumulated on the surface of the body forming the image, and that the agency of heat was important only as it facilitated the evaporation.

He added, as his belief, that all substances evaporated at all times and under all temperatures; the only difference being in the rate: in one case it was inappreciable from its slowness, in another it was distinguished readily by the phenomena which it produced.

In the course of his remarks, he alluded to *the first employment of bromine* in the photographic processes, and exhibited the first daguerreotype specimen produced by means of it. It was made in Philadelphia, by himself and Mr. Cornelius, in *December, 1839*.

The remarks of Dr. Goddard led to a free conversation on the subject, in which Mr. Saxton, Professor Henry, Professor James Rogers, and other gentlemen took part. In the course of it, the following account was given of Mr. Saxton's experiments:

A gold coin, half an eagle, which had been dipped in pure nitric acid, then washed in distilled water, and afterwards dried by whirling

in the air, was placed on a well-prepared daguerreotype plate, and suffered to remain undisturbed for four days. At the end of this time no impression was visible when the plate was breathed on, except at two spots corresponding to the opposite sides of the coin where it had been grasped by the wooden pincers when plunged into the acid. A copper coin was next placed above a daguerreotype plate, with nothing between them but an exceedingly thin plate of mica, which had been split from the middle of a thick piece. But after so remaining for three days, no impression of the coin could be observed, though the mica was found, by actual measurement, to be less than the one-thousandth of an inch in thickness. The same coin placed on the same plate, without the interposed mica, gave an impression in the course of four hours; and when the coin was slightly warmed, a like effect was produced in one hour.

To determine if there was any difference in the screening effect of different substances, a thin plate of sulphate of lime was next placed between the coin and the prepared plate, and the whole suffered to remain five days; at the end of this time, however, no image could be perceived.

In another experiment, a thin plate of glass was interposed between the coin and the plate, with the same negative result. The experiments were also varied by using different metals; but in no case were any effects produced through the thinnest transparent substance which could be procured.

That this was not due to the distance of the coin from the plate, was evident from the fact that when the former was supported by pieces of mica under the edges, at the same distance as in the last experiment, an image of the part of the coin not screened by the mica was impressed on the plate, while no such effect was produced by the parts under which the mica was placed.

As, then, those parts of the coin which are either perfectly clean or which have been thus screened give no image, the conclusion is that the effects observed by Moser are due to the evaporation of the volatile matter which has infilmed the coin. Some parts of the coin, such as the salient points of the figures, would be differently soiled from the others, and would also evaporate the volatile or fatty matter differently; and when the coin is placed very near a polished surface, the condensation of the evaporated matter on this surface would be different at different points, and present the appearance of an image.

The principle of the formation of these images may be simply illustrated by slightly touching the point of the finger to a clean plate of

THE FIRST PHOTO-MECHANICAL REPRODUCTION.

MADE BY JOSEPH SAXTON, A.D. 1841.

NEGATIVE BY JULIUS F. SACHSE.

VIDE PAGE 453.

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Professor Rogers [illegible]
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the Am. Philo. S[illegible]

A Photo-electric [illegible] — News comes [illegible]
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THE FIRST PHOTO-MECHANICAL REPRODUCTION.

MADE BY JOSEPH SAXTON, A.D. 1841

NEGATIVE BY JULIUS F. SACHSE

SEE PAGE 471

glass. If the plate be afterwards breathed on, the vapour will be differently condensed on the parts which have been in contact with the raised lines of the skin ; and hence an image of the surface of the finger will be exhibited on the glass. If the finger could be held at the distance of the one-fiftieth of an inch for a few hours, the same effect would be produced by the unequal vaporization.

The same conclusion has also been arrived at by M. Fizeau, and was communicated to M. Arago in November last; but the investigations of Mr. Saxton were entirely independent of any knowledge of the French experiments, and his explanation of the phenomenon had been communicated to Professor Henry and other members of the the Society, before any account of the experiments of M. Fizeau reached this country.

Professor Rogers also mentioned that he had repeated some of the experiments of Mr. Saxton at the time, and has been fully convinced that his explanation of the images was the true one.—(Proceedings of the Am. Philo. Society, Vol. III., pp. 179, 180, 181).

(*To be continued.*)

A Photo-electric Detector.—News comes from Toledo, O., of the successful use there of a camera and flash light in the detection and identification of two young burglars.

This new photo-electric detector works as follows:—The flash-light powder is placed in a small cup above a disk roughened on the under side, beneath which is a common lucifer match held vertically against it.

As the burglar enters he steps on the electric mat on the floor, thus closing the circuit. This throws a switch over so that the flash-light apparatus is now in the circuit. The spring which controls the disk over the lucifer match is set in motion, the match is lighted, and the flash light material is ignited. Through the powder box containing the flash-light runs a light fuse wire, which is a part of the circuit controlling the operation of the drop-shutter of the camera. Therefore, as soon as the flash goes off, the fuse wire is destroyed, the circuit to the camera shutter is closed and the latter drops, the picture having been secured in the brief exposure of the plate. It will be observed that the exposure and the flash are simultaneous, and the exposure is completed by the action of the light itself. The inventor has twice employed the apparatus to detect thieves, and each time with success.

ELEMENTARY THEORY OF THE EQUIVALENT FOCUS. IV.

BY PROF. HENRY CREW, LICK OBSERVATORY.

Definition of Symbols Used.—

f_2 and f'_2 = first and second focal points of surface "2"; or, in the case of a combination of lenses, the first and second principal foci of lens "2."

F_2 and F'_2 = first and second focal lengths of surface "2"; or, in the case of a combination of lenses, the first and second principal focal lengths of lens "2."

f_4 and f'_4 = same as f_2 and f'_2 except that they refer to surface or lens "4."

F_4 and F'_4 = same as F_2 and F'_2, except that they refer to surface or lens "4."

$f_{2,4}$ and $f'_{2,4}$ = same as f_2 and f'_2, except that they refer to the combination of surfaces or lenses "2" and "4."

$F_{2,4}$ and $F'_{2,4}$ = distances of first and second principal foci of combination from f_2 and f'_4, respectively.

F and F′ = first and second principal focal lengths of the combination.

a = position of luminous point on axis.

a' and a'' = positions of first and second images of a, respectively. When only one image is considered, a' alone is used.

I = height of object.

I′ and I″ = equal height of first and second image of I, respectively.

L is always the distance of an image or object from the focus of the surface or lens indicated by the subscript.

K always denotes the distance of an image or object from the focus of a combination indicated in the subscript.

T = thickness of a lens.

D = the distance from the second principal focus of a second surface or lens.

$W_{2,3}$ = the distance from the second principal point of the first lens to the first principal point of the second lens of a combination.

H = distance from the first principal point to the second principal point of a lens or combination.

H_1 = distance from first to second principal point of the *first* lens of a combination.

H_2 = distance from first to second principal point of the second lens of a combination.

C' = distance from back surface of lens or combination to the second principal point of lens or combination.

Numerical Illustrations of the Preceding Equations.

I.—*Case of Refracting Surface.*

Given, a spherical surface, convex towards the incident ray, having a radius of 4 inches, and bounding a medium whose refractive index is 1.6. *Required*, the second principal focal length.

Here, R_2 is positive and, hence, Eq. 9 gives us

$$F_2' = \frac{1.6}{0.6}\,4 = +10\tfrac{2}{3} \text{ inches.}$$

Eq. 11 gives at once the first principal focal length thus

$$F_1 = -\frac{+10\tfrac{2}{3}}{1.6} = -6\tfrac{2}{3} \text{ inches.}$$

II.—*Example of a Concave Meniscus.*

Imagine a simple lens made up of the two following surfaces. The first surface (the one denoted by the subscript "2") has a radius of curvature of +6 in. The second surface (the one denoted by the subscript "4"), has a radius of +5 in. The thickness of the lens is 0.3 in., and the refractive index of the glass is 1.5. What is the "equivalent focus"?

Here we have given R_2, R_4, μ, and T, to find F.

Since, Eq. 25,

$$F = \frac{F_2 F_4}{D}$$

it will be necessary to compute F_2, F_4, and D.

By Eq. 10,

$$F_2 = \frac{-6}{1.5-1} = -12 \text{ inches.}$$

and

$$F_4 = \frac{-5}{\left(\frac{1}{1.5}\right)-1} = +15 \text{ inches.}$$

By Eq. 11,

$$F_2' = -\mu F_2 = +18 \text{ inches}$$

Since

$$T - D = F'_2 - F_4$$

$$D = 0.3 - 18.0 + 15.0 = -2.7 \text{ inches}$$

Hence

$$F = \frac{F_2 F_4}{D} = \frac{(-12)(+15)}{-2.7}$$

or

$$F = +\ 6.6 \text{ inches}$$

and

$$F' = -6.6 \text{ inches}$$

From the negative value thus obtained for the second principal focal length (the equivalent focus) it is evident that the lens is a divergent one, and that the first principal focus is to right of the first principal plane. Eq. 25 might also be employed, by substituting from Eqs. 9 and 10, to determine what refractive index must be employed to produce a lens of any given focal length.

III.—*To find the Separation of the Principal Planes.*

For this purpose we have only to substitute in Eq. 32 as follows:

$$H = T\left(\frac{T - R_2 + R_4}{D}\right) = 0.3\left(\frac{0.3 - 6 + 5}{-2.7}\right)$$

or

$$H = +\ 0.077 \text{ inches} +$$

Note the positive sign, which here indicates that the second principal plane is to the right of the first.

IV.—*To find the Position of the Principal Planes.*

Up to this point, we have only found how far apart these two planes are. If it be asked in what part of the lens they are situated, either Eq. 33 or Eq. 34 will answer the question.

The distance of the first principal point from the first surface of the lens is, Eq. 34,

$$C = \frac{F_2T}{D} = \frac{(-12)(+0.3)}{-2.7}$$

or

$$C = +1.33 \text{ inches}$$

This shows us that the first principal point is more than an inch outside of the glass, and is to the right.

Let us find the second principal point. Its distance from the second surface is C′, where, Eq. 33,

$$C' = \frac{F'_4T}{D}$$

Now, Eq. 11,

$$F'_4 = -\mu F_4 = -\left(\frac{1}{1.5}\right)(+15.)$$

or

$$F_4 = -10 \text{ inches}$$

Hence

$$C' = \frac{(-10)(+0.3)}{-2.7} = +1.111 \text{ inches}$$

The second principal point is also more than an inch to the right of the lens.

Check.

If our computations are correct, we should have an identity on substituting, in the following equation, the numerical values which we have obtained

$$T + C' = H + C$$

$$0.3 + 1.111 = 0.077 + 1.33$$

or

$$1.41 = 1.41$$

V.—*Example of a Combination of Lenses.*

The use of these equations may be well illustrated in the determination of the cardinal points of one of the new telephotographic lenses. Let us consider a combination made up of an 8-inch positive element and a 2-inch negative element. Suppose the positive element in front, and suppose the adjacent principal planes of these two lenses to be separated by a distance of 6½ inches. If the principal points of the

first lens are separated by 0.1 inch, and those of the second lens by 0.05 inch, we shall have, for data

$$-F_2 = F'_2 = +8.0 \text{ inches}$$

$$H_1 = +0.1 \text{ inches}$$

$$-F_4 = F'_4 = -2.0 \text{ inches}$$

$$H_2 = +0.05 \text{ inches}$$

$$W_{2,3} = +6.5 \text{ inches}$$

Required. (*a*) The magnifying power of the combination as compared with the single positive element.

(*b*) The "back focus" of the combination.

(*c*) The distance apart of the principal planes.

For the "equivalent focus" we have, Eq. 38,

$$F = \frac{F_2 F_4}{D}$$

$$D = W_{2,3} - F_2' + F_4 = 6.5 - 8 + 2 = +0.5 \text{ inches.}$$

This gives for F

$$F = \frac{(-8)(+2)}{+0.5} = -32 \text{ inches}$$

Since the positive element has a focus of 8 inches, the combination will give a picture on the ground glass enlarged four times. Mr. Burnham has described in the *Beacon*, for April, 1892, a very convenient and satisfactory method of using such an enlarging lens in an ordinary camera.

(*b*) Let us now proceed to find the "back focus" of the combination. This is done immediately by substituting in Eq. 42

$$C' = F'_4 \left(\frac{W_{2,3}}{D} + \frac{T_2}{D_2}\right)$$

In the present case, and indeed in many others,

$$\frac{T_2}{D_2}$$

is negligibly small compared with

$$\frac{W_{2,3}}{D}$$

So that we are quite safe in employing the approximate expression,

$$C' = F'_4 \frac{W_{2',3}}{D} = (-2) \frac{(+6.5)}{(+0.5)}$$

or

$$C' = -26 \text{ inches}$$

That is to say, the second principal point is 26 inches to the left of the concave lens.

The "back focus" is, therefore, 6 inches, the ground glass being 32 inches behind the second principal point. From the ground glass to the positive lens is then 14 inches. For using a combination of this kind, therefore, a camera would require a draw of 14 inches.

(*c*) For the distance apart of the principal planes, we have only to substitute numerical values in Eq. 41.

$$H = H_1 + H_2 - \frac{(W_{2',3})^2}{F_2' + F_4' - W_{2',3}}$$

$$= 0.1 + 0.05 - \frac{6.5^2}{8 - 2 - 6.5}$$

$$= +84.35 \text{ inches}$$

Since H is the distance from the first to the second principal point, it is evident that the first principal point is still further in front of the lens than the second. The reader will do well to check this value of H by computing the distance from the front surface of the combination to the first principal point.

That is, compute the value of C from

$$C = F_2 \frac{W_{2',3}}{D}$$

and substitute numerical values in the following equation,

$$W_{2',3} + C' = H + C$$

A few Practical Methods for Measuring Equivalent Foci.

I.—*By the use of Newton's Rule.*

Mount the lens or combination, necessarily a convergent one, on a scale parallel to the optical axis. Determine by the use of parallel rays the positions of the first and second principal foci. Without moving the lens on the scale determine the positions of any two con-

jugate foci, preferably, of course, two whose distances from the principal foci can be measured with accuracy.

The distance of the first conjugate point from the first principal focus will be $K_{2,4}$, and the distance of the second conjugate point from the principal focus will be $K'_{2,4}$

Now by Eq. 26,

$$K_{2,4} K'_{2,4} = -F^2 \quad \text{Eq. 43.}$$

$K_{2,4}$ and $K'_{2,4}$ are then the only quantities to be measured. If we are to examine a negative lens, it must first be combined with a stronger positive one, the latter of known focal length.

This method is not easy to carry out in practice, for it is difficult, *without a more or less elaborate outfit*, to mark on a scale the position of an image with any high degree of accuracy.

The distance between the principal planes is here obtained by subtracting twice the equivalent focus from the distance between the principal foci. By noting the position of either surface of the lens on the scale one can determine the position of the principal points, and mark them on the mount of the lens.

II.—*MacGillavry's Method.**

The following method and reference I find in a lecture by Prof. S. P. Thompson, delivered before the Society of Arts,† on Nov. 27, 1891. MacGillavry mounts the lens so as to slide parallel to the optical axis. If the object and image be separated by a distance greater than four times the focal length plus the separation of the principal planes, there will be two positions of the lens in which the object and image will occupy the same positions relative to one another.

In one of these positions the image will be larger than the object; in the other, smaller.

The distance from the object to the nearer position of the *first* principal plane let us call M, the distance from the *second* principal plane to the image let us call N. H is the distance between the principal planes, and A the distance between image and object. Let ρ denote the magnifying power of the lens when in the position nearer the object. The distance between the two positions of the lens which give distinct focus at the fixed distance A, call Q.

* MACGILLAVRY.—De bepaling der focaal-afstanden van samengestelde optische stelsels. *Mandblad voor Natuur-wetenschappen*, V., 1875, p. 73.

† In the journal of this Society for the above date the reader will find a large number of approximate methods given. Among these, however, the only strictly accurate ones are the first three of the present list.

Then we have

$$N - M = Q \quad \ldots \ldots \ldots \ldots \quad \text{Eq. 43.}$$

$$N + M + H = A \quad \ldots \ldots \ldots \ldots \quad \text{Eq. 44.}$$

$$\frac{N}{M} = \rho \quad \ldots \ldots \ldots \ldots \quad \text{Eq. 45.}$$

and, by Newton's rule,

$$(N-F)\,(M-F) = F^2 \quad \ldots \ldots \ldots \ldots \quad \text{Eq. 27.}$$

Solving these, one obtains,

$$H = \frac{Q + A - \rho\,(A - Q)}{1 - \rho} \quad \ldots \ldots \ldots \quad \text{Eq. 46.}$$

and

$$F = \frac{\rho\,(A - H)}{(\rho + 1)^2} \quad \ldots \ldots \ldots \ldots \quad \text{Eq. 47.}$$

or

$$F = \frac{Q + A - H}{2\,(\rho + 1)} \quad \ldots \ldots \ldots \ldots \quad \text{Eq. 48.}$$

Now the quantity Q, it should be noted, is an exceedingly easy one to observe, for an index attached to any part of the mounting will serve to measure the displacement Q, as the lens is moved along the scale.

The distance A is more difficult to obtain. But dropping fine plumb lines, one in the focal plane and one in the conjugate, the distance between these threads can be measured in a variety of ways and with considerable accuracy.

The ratio, ρ, is confessedly the most difficult quantity to measure, unless one is provided with a good micrometer eyepiece.

In this case, the writer has found that a good method is to use for an object two parallel* spider webs, and then measure the ratio of the images with the micrometer eyepiece. The ratio of the images formed by the lens in its two positions will be

* A pair of spider webs can be brought to parallelism very readily by weighting them with small pieces of lead and suspending them so that the lower ends of the fibres with their attached weights dip into a small cup of oil; this last to prevent vibrations from wind currents.

$$\frac{\rho}{1/\rho} = \rho^2$$

Then from equations 27, 43 and 45 it follows that

$$F = \frac{\rho\, Q}{\rho^2 - 1} \quad \ldots\ldots\ldots\ldots\ldots \quad \text{Eq. 49.}$$

This expression is valuable because it avoids the measurement of the distance between the image and the object.

In illustration of this method, I have made the following measurements of Mr. Burnham's Laverne lens, a rectilinear doublet, and find

$$A = 36.89 \text{ inches.}$$

$$Q = 7.08 \text{ inches.}$$

$$\rho = 1.485 \text{ inches.}$$

whence, by Eq. 46,

$$H = +\ 0.468 \text{ inches.}$$

The principal points are then about half an inch apart.

For the value of the equivalent focus, we obtain

from Eq. 47, $F = 8.75$ inches

from Eq. 48, $F = 8.72$ inches

from Eq. 49, $F = 8.76$ inches

III.—*Cornu's Method.*

This is a variation of the first method given above. Cornu uses for an object some ink lines drawn on one surface of the lens. Then, with a long-focus microscope, he gets the distance between the principal focus and the image of these ink lines formed in the interior of the lens; he also obtains the distance from the second principal focus to the nearer surface of the lens. The lens is then reversed, and the same thing repeated for the other side. From these measures one obtains directly, by Newton's rule, the focal length and position of the principal planes.

IV.—*Pin-hole Method.*

This is a very handy method for a lens mounted in a camera.

Focus the lens on a very distant object, unscrew the lens from its mount, and replace it by a piece of cardboard with a small hole in it.

When the cardboard is put in a position where it gives an image on the ground glass of exactly the same size as that yielded by the lens, it then occupies the second principal plane of the lens.

The "equivalent focus," of course, is the distance from the cardboard to the ground glass.

If instead of this pin-hole one selects a cheap spectacle lens which will give an image of the required size, he will obtain a close approximation to the true focal length, especially if he corrects for the distance of the second principal plane of the lens from the back surface of it.

V.—*Method of Thomas Grubb.*

This method also depends upon the fact that the size of the image is a function of the "equivalent focus."

Mr. Grubb draws two parallel and vertical lines on the ground glass. He then focuses on a distant vertical line, say in the front of some building. The camera, being placed upon a table, is now turned so that the image of this line coincides with one of the pencil marks on the ground glass. Using one side of the camera, a line is now drawn upon the table. Next, the camera is turned so that the image of the distant vertical line now coincides with the *other* lead line on the ground glass. The side of the camera is again used as a ruler. Produce the two lines thus drawn upon the table until they meet. Call the angle at which they intersect θ, and the distance between the lead lines on the ground glass call D.

Then

$$D = 2\,F \sin.\frac{\theta}{2}$$

or

$$F = \frac{D}{2 \sin \theta/_2} \quad \ldots\ldots\ldots\ldots \quad \text{Eq. 50.}$$

There are a number of methods besides these which we have just mentioned, but most of them are approximations to or modifications of the preceding. For all practical purposes one chooses that method for which he is best outfitted, provided, of course, the method is reasonably good.

What effect has the dark-room illumination upon a photographer who is color-blind?

OUR ILLUSTRATIONS.

By the courtesy of Drs. Keely and Davis, authors of "In Arctic Seas," we are enabled to present our readers portraits of Lieut. Robert E. Peary and his heroic wife who shared the Artic winter with her husband.

Lieut. Peary dnring his expedition to the frozen North, under the auspices of the Academy of Natural Sciences, has added another to the long and brilliant list of important scientific achievements which have been brought about by our old Philadelphia institution, viz., the determination of the Greenland ice cap.

The photographic outfit of both the main as well as the relief expedition was as complete as possible. The American Journal of Photography's special representative with the relief corps being especially well provided with largest Kodaks and Eastman films, some of the results will be brought before our readers at the earliest issue possible.

Our extra illustration, a copy in half-tone of the first mechanical reproduction in which a photographic process was utilized. The especial attention of our readers is again called to the "Historical Retrospect of the Dawn of Photography," now being published in the American Journal of Photography. All the facts and illustrations given are obtained from authentic sources, many of which are now for the first time presented to the photographic world at large.

Snap Shots at Sails.—On September 9th the California Camera Club of San Francisco paid a visit to the Oakland Canoe Club. About twenty-five members of the former organization came across the bay early in the morning, and were escorted to the boathouse by the officers of the Oakland club. In the early part of the day the Canoe men showed their guests over their buildings and manned their best canoes that the visitors might poke the eyes of their assorted cameras at them, and just after noon a delicious luncheon was served in the larger clubhouse.

In the afternoon a programme of races was carried out for the entertainment of the visiting artists, and the excitement of the sailors of the little craft. The first race was a very unexciting one owing to the light breeze and the difficulty in getting around the stakeboat. A novice race for a silver cup followed. The paddling race was the feature of the day, and was most enjoyed by the visitors. The tub tournament was declared a draw. After the races the members of the Camera Club were taken out in the boats for a few hours' ride along the city front.

DRY PLATE AS DETECTIVE.

IT is well-known that the photographic camera is keener in distinguishing things than the human eye. The case is well-known of the photographer who took a picture of a woman who appeared to be in good health, and whose skin seemed perfectly normal to the eyes of those who met her. But in the photographic negative there were a lot of queer spots or freckles upon the face which the photographer could not account for; they were not due to anything in the process of taking the picture, and they did not appear to be in the sitter's face, but in twenty-four hours the woman came down with small-pox, and it turned out that the camera had detected the spots in the skin which no eye could as yet perceive. Well, the case is one in which, so to speak, the camera has detected a kind of moral spotting on a human face.

A person whose parents on both sides had been very bad in various ways, and who, under the laws of heredity, was thoroughly entitled to be bad, too. was, on the contrary, very ememplary and thoroughly well behaved. Furthermore. this person was handsome and noble of feature, and gentle and winning in facial expression. All who saw the face were at once prepossessed by it.

But whenever this person was photographed something cruel and criminal was sure to be revealed in the picture. If one had been an expert in criminal neurology, if there is any such science, he might have said, when asked to give an opinion of the character of the subject from the photograph: "This person is a forger or embezzler on a large scale, with a strong tendency toward counterfeiting, and a perceptible leaning in the direction of homicide." All the vices of the person's ancestors seemed to be revealed in the photograph. Perhaps this supernatural sensitiveness of the chemically-prepared plate accounts for the fact that a photograph can almost always be depended upon to bring out the worst hat there is in one. Of course, there is something vicious in everybody's ancestry, since everybody's ancestry takes in the entire population of a great country if you go back far enough.

The viciousness that there is in you is latent in your disposition, owing to favorable circumstances and influence, but it is not latent in the chemically-prepared plate, which has no moral side to make allowance with; it spies out the traces of the stifled hankerings, and perceives otherwise invisible evidences of completely suppressed besetting sins, and these it candidly reports on the photographic print. We say that the photograph is truthful, but it isn't. If it reports a person a liar and a murderer who is nothing of the kind, but who has in his face some ordinary unperceived lines which are there because some of his ancestors were bad, it is a false thing.—*Boston Evening Transcript.*

CHANGES IN THE STAFF AT THE LICK OBSERVATORY.

IT has been known for some time, according to *Astronomy and Astro Physics*, that important changes were contemplated in the Staff of Lick Observatory. This has been understood by some astronomers acquainted with the personnel at Mount Hamilton, and it has also been noticed in the leading papers of San Francisco during the last two months. Hints that all things were not moving smoothly appeared in the resignation of Professor Keeler in the spring of 1891. Later Mr. Burnham has resigned, and now it appears that Professor Henry Crew is to exchange his place for the professorship of Physics in the Northwestern University at Evanston, Ill.; both of the latter gentlemen being well known to our readers from their valued contributions to the AMERICAN JOURNAL OF PHOTOGRAPHY.

It is true that Professor Keeler was invited back to the Allegheny Observatory to take its directorship in the stead of our distinguished Langley, an honor indeed that he might well covet, but it was the wonder of his wider circle of friends that he should choose to leave the finest equipment of astronomical instruments in the world for another at present very ordinary, if not positively inferior, for common lines of modern research. Astronomers, the world over, know that Professor Keeler is a leading authority in

spectroscopy, and that he had designed and most successfully used one of the most effective instruments in this research now known to the science. It is also well known that he had gained in a short time, for a young man, an enviable reputation at home and abroad by skillful work and astonishing results in the new and difficult spectroscopic study of the nebulæ. So true is this, that his dicta in regard to the character and meaning of nebular spectra have been received as high authority everywhere by the best talent in astro-physics. Now it seems very strange that Professor Keeler should easily give up all this bright prospect, and be content to wait a long time before it can be possible for him to take up his delightful work where he left it more than a year ago. We think astronomers generally will wonder why Professor Keeler should abandon such a position as he held at the Lick Observatory, and so deprive himself and astronomy of the benefits in spectroscopical research which he was peculiarly fitted to prosecute.

The cause of Mr. Burnham's resignation is also unknown. We have no theory to advance about it, but we remember his connection with the Lick Observatory from the first with personal interest and personal pride. We need hardly say to the readers of this journal that Sherman Wesley Burnham in 1879 was chosen by those in authority as expert observer to go to California and determine the particular mountain site where, later, the Lick Observatory should be located; and that subsequently it was his report and his judgment of the fitness of the site at Mount Hamilton that led to its adoption more than that of any other man so far as we know. In a special sense would Mr. Burnham feel an interest in the growth and maintenance of that grand Observatory, since it was his work of testing the site with his immortal six-inch telescope, and the discoveries of double-stars there made in the first scientific expedition to the mountain top, that gave the beginning of interest in Mount Hamilton as a suitable point for astronomical work. Since that time Mr. Burnham has been identified in many important ways with the growth and the success of this great Observatory. His double star work must be acknowledged as without an equal anywhere. His catalogues, his standing in the Royal Astronomical Society of

England, and in other scientific societies on the continent, fully attest this. His practical knowledge of photography and his studious application of it to various fields of astronomical work have gained for him wide reputation as not only an artist, but an authority in this branch of science. In view of all this, it is a wonder that Mr. Burnham should leave Lick Observatory and accept the position of a clerk in one of the courts of Chicago. It is true that the new position pays a higher salary than that of senior astronomer in the Lick Observatory, but we are not aware that Mr. Burnham ever complained of the smallness of salary in any position that he ever held, however small. He is not that kind of a man; his mind and his purpose are too large to be swayed by such motives. This could hardly be true anyhow in regard to the positions at Mount Hamilton, for they are all reasonably well paid in view of all the circumstances.

But the thing most to be regretted in these late changes, is the fact that this great Observatory is rapidly losing its great men. As necessary as powerful instruments are to high success in modern research, it must never be forgotten that men are more than instruments. Whatever the position, the *man* must rank his place and his instruments, or he will degrade both. That Director Holden has done masterful work in building up the Lick Observatory so far is admitted on every hand. That was no small thing to do. It was well done; not perfectly, as he well knows, and himself says, but still it was well done. And one of the best things in his part of it was that he had the foresight to select and the ability to secure for his staff some of the best men to be found in the United States. In this he was eminently wise. But now that these excellent men are rapidly leaving the Observatory, it is not evident that he is wise in permitting this, if it lies in his power to prevent it. In any phase of the matter, it is a calamity to the Observatory and to astronomy. For first-rate men, like any others, can do better work the longer they remain in one position, other things being equal. New men cannot master large and delicate instruments in a day. It requires many a day of painstaking labor and waiting for the skilful astronomer to get from his fine instrument the very best that it

can give. It may do for manager Frick at the Homestead Mills to say that he can easily get others to take the places of his trained men to work his improved machinery, and turn out just as good armor plate as in the past, but his skilled workmen know better. Much more is this true in scientific work, and we believe no one knows it better than does Professor Holden, and it is not probable that any course will be taken in the future which shall not be for the best interest of the Lick Observatory and for Astronomy in general.

As we close this paragraph, the news comes to us that Professor Henry Crew, of Lick Observatory, has been elected Professor of Physics in the Northwestern University at Evanston, Ill. We are also informed that he will probably accept the position. Mr. Barnard and Mr. Schaeberle are the remaining older members of the staff.

A well-known artist, who hitherto has been a great enthusiast for the propagation of "art among the masses," sends us the following story, which leads him to take a rather gloomy view of the situation. For the purpose of a picture on which he was engaged he required a well-kept donkey as a model, and commissioned a friend to hire such an animal. A costermonger was found possessed of one in every way suitable, and was told that an artist would be glad to paint the "moke." The owner looked annoyed, even angry, at the request. Later he called at the gentleman's house, and said, "I understand you want to paint my donkey?" "Yes," replied the artist, "I shall be very much pleased if you will allow me." "Why," continued the coster, "ain't he a good enough color already?" From a painter's point of view the question was unanswerable, and set the artist pondering on the great work that still remains to be done in the art education of the people.—*London Telegraph.*

It would be interesting to know just what was the standard of excellence adopted by the judges at the late exhibition at Boston. An inspection of the exhibits returned to this city, certainly shows several surprises. Granting that it is true that the specimens sent by no means represent the amateur or professional work of Philadelphia or the local society in particular, it is to the unbiased spectator at least strange that the result should have been as announced.

Photographic Hints and Formulæ.

Rodinal.—The manufacturer of this new developing agent in Germany, furnishes the following formulae as giving the best results:—

Normal exposures: rodinal, 1 part; water, 30 parts.

Over-exposures: rodinal, 1 part; water, 30 parts. Brom. potassium as needed, or old developer.

Fixing bath: water, 100 parts; sulph. soda cryst., 5 parts; sulph. acid c. p., 1 part; then add. hypo. soda, 20 parts.

For lantern slides, Ellerslie Wallace: rodinal, 1 part; water, 30 parts. To 4 ozs. of above, add 10 drops of stock solution.

Under-exposures: rodinal, 1 part; water, 40 parts.

For strong negatives; rodinal, 1 part; water, 20 parts. Brom. potass. as needed.

For over-exposures: rodinal, 2 drams; water, 4 ozs.

For normal exposures: rodinal, 2 drams; water, 6 ozs.

For extremely over-exposed plates: rodinal, 2 drams; water, 2 ozs. Bromide solution. A few drops of a 20 gr. solution bromide potassium.

Formulae by W. S. Davis, for instantaneous exposures: rodinal, 2 drams; water, 8 ozs. Carb. potash, 50 grain solution, 2 to 5 drops.

This will develope a plate, so far overtimed that it would be worthless with any other developer now known.

The Arrangement of Slides for Exhibiting.—Slides should be arranged in the order in which they are to be placed in the lantern, regardless of their shapes or sizes. It may cause a little inconvenience to find a place to so arrange them, but it would be a great deal more inconvenient if the slides were placed in the lantern wrong. Some lecturers think all that is necessary is to furnish a printed list of the slides in the order in which they are to be presented, and that the operator can pick them out just to correspond with that list. Theoretically this is a very pretty way of proceeding, but practically it is of no use. The operator will have all the time that is at his disposal fully occupied in attending to his instrument, especially if he use the oxy-hydrogen or oxy-ether light. If the slides are not so arranged, a similarity of names on a written list would perhaps lead him to get the wrong pictures first; and then again the slides should be placed all in one position,—that is, so arranged that they can be picked up and placed in the lantern without any examination as to whether they are upside down or wrong end foremost, because it is very difficult in a darkened room to distinguish the right way from the wrong way. What is better still, each slide should be labeled; at the lower left-hand

corner of the right side of the slide will be found the best place to put the label, for this is the part of the slide on which he will place his thumb when he puts the slide into the lantern, if working them from the right-hand side.—*The Exhibitor.*

A well deserved honor has been paid to a Philadelphia inventor by the Royal Society of Arts of Great Britain, a silver medal having been awarded to Mr. Frederic E. Ives, for his paper on "Composite Heliochromy," read before that body a few weeks ago. British scientists have recognized in Mr. Ives's work the nearest approach which has yet been made to photography in the colors of nature.

Progress in Photography.—The *London News* lately regaled its readers with the following account of photographic progress. It is needless to state that the wonderful discovery emanates from sunny France.

"A map of the heavens is being prepared at a cost of £1,200,000 (which the leading nations have agreed to raise), as an example of what telescope photography can do. Instantaneous photography seems to have attained perfection, for it is now possible to fix the image of a cannon ball flying through the air. Even microbes are now being photographed. A young French chemist, M. Henri Courtonne, is credited with a new discovery, for which we have been looking to Mr. Edison. Sound being transmissible by telephone, M. Courtonne argued by a rigorous analogy that light might be transmitted too. As the telephone consists of a transmitter, a wire, and a receiver, so there was reason to believe that these three organs might be adapted for transmitting light vibrations, and for this purpose the transmitter and receiver should be prepared chemically for receiving and giving out light instead of sound vibrations. This was done by substituting sensitized photographic plates for the ordinary telephone plate. One of the plates was placed in front of an aperture through which an image was cast, and this image has been forwarded by wire and has been seen at the other end. The first apparatus was very imperfect, and M. Courtonne having heard that Mr. Edison was on the track of a similar discovery, resolved to publish his experiments, a description of which he, however, sent in a sealed letter to the Academy in 1889. This letter is only to be opened at the sender's request.

"The *Figaro* says that the consequences of the telephotography cannot be over-estimated. To-morrow, it says, you will see in Paris the image of a man smoking in St. Petersburg."

When giving a lecture on hand-cameras, Mr. W. D. Welford thus summed up the requisite qualities necessary for a hand-camerist: "He

must be of quick perception, prompt decision, and instant action, although at the same time he must be coolness itself."

A New Process Discovered for Manufacturing Aluminium.—A private exhibition to a few interested capitalists, says the Philadelphia *Ledger*, was given a short time ago, of the new process for making aluminium invented by Colonel William Frishmuth, at the laboratory of the Enterprise Aluminium Company, Rush and Amber streets. The process is a secret one in certain particulars, but the general method was demonstrated to the company present.

The process is partly chemical and partly electrical, the aluminium oxide being extracted from pure clay and dissolved. The solution is then exposed to the electric current, which causes the pure metal to be thrown down on brass plates. From this it is removed by an ingenious but very simple chemical process in a state of almost perfect purity, and in the form of a silvery impalpable powder. It only remains to smelt it into ingots.

Colonel Frishmuth estimates that the aluminium can be extracted at a price far below its present market value, and in any desired quantity. But a singular circumstance connected with it is that the bye-product or residue from the chemical treatment of the clay possesses high value as a fertilizer, and this, it is claimed, will be sufficient to pay all the expenses of the operation. An analysis of the bye-product, made by an expert chemist without knowledge of how it was produced, was submitted. He estimated its value as a fertilizer at from $8 to $10 per ton.

A chart has been procured and a company formed, which will immediately proceed to manufacture the metal commercially. It is designed to operate the first plant in this city for a time, the clay being brought here from New Jersey, where a bed free from deleterious substances is found. The promoters are so confident of success that they think that in a short time the profits will enable them to put up extensive works in the immediate vicinity of the beds.

I heard a "missionary" (that is a traveling man) once say that he would not go on the road for a firm that didn't advertise, for it took too much valuable time to explain to every supposed buyer who he was, where he came from, and what the merits of his goods were. He said, moreover, that if the buyer had all this imformation beforehand he generally received him cordially, was glad to see him, and had been looking for him for some time.—*Ex.*

Telegraphing through the Air without Wires.—Professor John Trowbridge of Harvard University, describes in the April issue of *The Chautauquan*, a series of experiments made by himself in telegraphing through the air without wires. The results of the various methods led him to decide against their practicability, but he concludes thus hopefully: Some time in the future we may find means of modifying the electrical condition of the earth—we will say to Chicago—so that a point at its antipodes will respond. When this is done, treaties of electrical reciprocity will have to be entered into between China and the United States.

The Germans propose to pass a law protecting business secrets. Several cases recently have become known where valuable hints were obtained through bribing workmen, or through sending experts into factories as common workmen. They of course only stayed long enough to obtain the necessary information and immediately afterwards sold it to a rival firm. Heavy punishment is to stop these proceedings.

A Human Analysis.—Dr. Lancaster, the famous London physician and surgeon, who analyzed the body of a man in the year 1875, gives the following result of his unique experiment: The body operated upon weighed 158 pounds exactly. From this mass of flesh, bones, muscles, etc., he obtained 23.1 pounds of carbon, 2.2 pounds of lime, 22.3 ounces of phosphorus, and 1 ounce each of sodium (salt), iron, potassium, magnesium, and silicon. Besides the above "solids" he obtained from the same subject 5,565 cubic feet of oxygen and 105,000 cubic feet of hydrogen, this latter weighing 15 pounds 4 ounces, and 52 cubic feet of nitrogen. All these elements combined into the following: one hundred and twenty-one pounds of water, 16 pounds of gelatine, 1¼ pounds fat, 8 pounds of fibrin and albumen, 7 pounds of phosphate of lime, and 2⅔ pounds of other mineral substances.

Under the circumstances it is asking a little too much to expect the registered Celestials to "look pleasant" while those photographs are being taken.—*Baltimore American.*

The *London Globe* gets off the following,—our report fails to state whether a sudden suspension of animation resulted from the effort—viz., regarding Ives's and Lippman's experiments in the direction of colored photographs. It said: "There will be many a slip, man, 'twixt Ives and 'twixt Lippmann, ere the difficulties are surmounted."

In the Twilight Hour.

ONE may live as a Conqueror, a King or Magistrate, but he must die as a man. The bed of death brings every man to his pure indiviuality, to the intense contemplation of that deepest and most solemn of all relations—the relation between the creature and his Creator. Here it is that fame and renown must fail to assist us, that all external things must fail to aid us; that friends, affection and human love and devotedness cannot succor us.

MONEY and time are the heaviest burdens of life, and the unhappiest of all mortals are those who have more of either than they know how to use.

THE miserable have no other medicine
But only hope.
—*Measure for Measure, Act III., Scene 1.*

SOME are born great, some achieve greatness, and some have greatness thrust upon them.—*Twelfth Night, Act III., Scene 4.*

PRESENT fears are less than horrible imaginings.—*Macbeth, Act I., Scene 2.*

'TIS my vocation, Hal; 'tis no sin for a man to labor in his vocation.—*Henry IV., Act I., Scene 2.*

SORROW breaks seasons and reposing hours,
Makes the night morning, and the noontide night.
—*King Richard III., Act I., Scene 2.*

MEN must endure
Their going hence, even as their coming hither.
—*King Lear, Act IV., Scene 2.*

O SWEAR not by the moon, the incontant moon,
That monthly changes in her circled orb,
Lest that thy love prove likewise variable.
—*Romeo and Juliet, Act III., Scene 2.*

BEWARE the Ides of March.
—*Julius Cæsar, Act I., Scene 2.*

THERE are more things in heaven and earth, Horatio,
Than are dreamt of in our philosophy.
—*Hamlet, Act I., Scene 2.*

LITTLE PLEASURES often banish melancholy better than higher and more exalted objects. No means ought to be thought to be too trifling which can oppose it either in ourselves or others.

OPPORTUNITY is the flower of time; and as the stalk may remain when the flower is cut off, so time may remain with us when opportunity is gone forever.

HE that sinks his vessel by overloading it, though it be with gold and silver and precious stones, will give his owner but an ill account of his voyage.—*Locke.*

IN private conversation between intimate friends the wisest men very often talk like the weakest; for, indeed, the talking with a friend is nothing else but talking aloud.

THE LAUGH of mirth that vibrates through the heart, the tears that freshen the dry wastes within, the music that brings childhood back, the prayer that calls the future near, the doubt that makes us meditate, the death that startles us with mystery, the hardship which forces us to struggle, the anxiety that ends in trust,—are all the true nourishment of our being.

WE NEVER respect persons who aim simply to amuse us. There is a vast difference between those we call amusing men and those we denominate entertaining; we laugh with the former, and reflect with the latter.

GOOD-BREEDING carries along with it a dignity that is respected by the most petulant. Ill-breeding invites and authorizes the familiarity of the most timid.

Literary and Business Notes.

HANDBUCH DER PHOTOGRAPHIE. By Major Giuseppe Pizzighelli. Vol. II. Second Edition. Published by Wilhelm Knapp, Halle a. S.

The demand for this handbook has made a second edition necessary. It is one of the best handbooks written in the German language. The present volume contains no less than five hundred and eighteen pages of information, illustrated by two hundred and seven illustrations printed in the text.

After a general introduction on the principles of the photographic processes in general, the main portion of the book is devoted to the negative and positive processes. Not the least important are the two concluding chapters treating on the "Determination of Time of Exposure" and the "Determination of Rapidity for Instantaneous Exposures." No library of a photographic student who can read German is complete without this handbook of comprehensive and practical knowledge.

PHOTOGRAPHIC ANNUAL FOR 1892. Edited by Henry Strumey. London: Iliffe & Son, 3 St. Bride St., Ludgate Circus, E. C. Price, half a crown.

A compendium of information and statistics of the year. The largest of all photographic annuals, almost a thousand pages of photographic information, fully illustrated with cuts in the text in addition to numerous full-page illustrations. Among the latter we recognize, on page 280, a gem from the AMERICAN JOURNAL OF PHOTOGRAPHY under a new title.

The Annual contains many useful tables of reference for practical workers. Tips for tyros, the sections devoted to photographic apparatus, chemicals, and manipulations are all replete with information. The lantern and appliances are also fully treated. The section on photographic trade-marks is an interesting novelty. "Photographic Annual" has a deservedly large sale in America as well as England.

PHOTOGRAPHISCHER ZEITVERTREIB. Herman Schnauss, Düsseldorf, 1892. Ed. Liesegang, Publisher.

A compilation of simple and easily-performed experiments with the camera. Third edition, 176 pages, with one hundred and ten illustrations. The book is divided into five sections, treating on photographic specialties, curiosities, home resources, photo-optical divertisements, and photographic copies. Translations of the book have been made into Russian and English. The work is interesting and entertaining.

CRAYON PORTRAITURE. By J. A. Barhydt. Illustrated. New York: The Baker & Taylor Company.

Mr. Barhydt, author of the articles on "Crayon Portraiture" in "Appleton's Annual Encyclopædia," 1890, publishes a revised and enlarged edition of his handbook for professional and amateur artists. This contains complete instructions for making crayon portraits on crayon paper, and on platinum, silver, and bromide enlargements. The coloring of photographs, engravings, and photogravures with transparent liquid water colors, and the making of French crystals, are fully treated. The manual has been carefully prepared, and furnishes a full knowledge of materials required for crayon work and directions for their use, manipulation, and all processes involved. An examinatian of the book proves that the field is entirely covered, and the requirements in the way of instruction have been fully met by Mr. Barhydt.

RECENT PATENTS.

ISSUE OF AUGUST 2D, 1892.

There were no photographic patents included in this issue.

ISSUE OF AUGUST 9TH, 1892.

There were no photographic patents included in this issue.

ISSUE OF AUGUST 16TH, 1892.

480,950.—Album clasp, J. C. Koch, St. Louis, Mo.
481,117.—Picture-frame fastener, C. F. Naegele, New York, N. Y.
480,953.—Picture-frame, J. Mauerhofer, New York, N. Y.
480,808.—Camera attachment, E. DeMoulin, Greenville, Ill.
480,995.—Camera shutter, W. H. Bristol, Hoboken, N. J.

ISSUE OF AUGUST 23D, 1892.

481,343.—Camera shutter, William H. Bristol, Hoboken, N. J.
481,333.—Frame for pictures, etc., Mayer Reinfeld, St. Louis, Mo.
481,217.—Picture frame, Paul Wiener, Chicago, Ill.

A Would-be Amateur.—A visitor to Birmingham Park was witness to an amusing and diverting incident. When the train which leaves West Chester at 1 p. m. arrived at the Park, there was quite a crowd to alight—and among them two women of good weight. They clasped hands and skipped along the sward to show folks, as they said, that stout and staid folk could be hilarious upon occasion. One of them, observing a photographer's camera placed, went up to it and asked a third party to pose for a picture, which she did, but lo! the tripod rested upon an incline, and, upon being jarred, toppled over, and the camera rolled down the hill, scattering the broken glass as it fell. The faces changed from round to oblong visages, but our would-be amateur artist stepped to the fore, and, while acknowledging she should not have disturbed it, offered to pay all damages, which the operator decided would be forty dollars. The party proceeded to the Park a sadder and wiser lot. Many learning of the accident, offered sympathy and felt the assessment extortionate, so made inquiry and learned that was the case. Later the unfortunate individual returned to the artist and found him taking pictures as usual. Still she insisted upon paying something, but as the loss amounted to ten cents only, the value of the ground glass, the affair was settled for one dollar. The one who posed for the picture says she has often heard of people breaking the glass with their beauty and she is now decided as to her personal appearance, but she will never forget her impressions as the camera came bounding toward her. The entire occurrence is hugely enjoyed now in the retrospect.

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AMERICAN JOURNAL
OF
PHOTOGRAPHY

THOS. H. McCOLLIN, Managing Editor.
JULIUS F. SACHSE, Editor. XANTHUS SMITH, Associate Editor.

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THE PHOTOGRAPHIC CONGRESS AUXILIARY.

IN connection with the World's Columbian Exhibition to be held at Chicago in 1893, it has been proposed to hold an "Auxiliary Congress of Photographers" at Chicago, some time during August of next year,—a scheme which, it is claimed, has received the approval and support of the exhibition authorities.

That a series of meetings of this kind would result in great value to all interested in the art science of photography, stands without a question; provided it would be intelligently and impartially conducted.

Thus far, to further this proposed undertaking, a committee has been appointed, consisting of eight persons, all residents of Chicago or immediate vicinity, including the chairman, who signs himself as "Chairman of the Committee of the World's Congress Auxiliary on a Congress of Photographers."

The only action of this committee which has thus far come to our notice, has been a "Preliminary Address," advising us of the appointment of an "Advisory Council" consisting of 120 members, all of which are supposed to have distinguished themselves in the various departments of the photographic art.

In analyzing the composition of this Advisory Council, it certainly shows some queer results. For instance, taking the American Section; it is remarkable how few representative photographers of national reputation are found among the committee and advisory council. In fact, a perusal of the list shows they are conspicuous by their absence. Further, it would be an inter-

esting item to know by whom or by what arbitrary standard this advisory council was elected. The forty-five American members which are supposed to represent the 49 States and Territories of the American Union, are selected from 23 States and Territories, thus leaving more than one-half, viz.,—26 without any representative. Of the fortunate States,—Arkansas, California, Colorado, Connecticut, Georgia, Indiana, Iowa, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Mississippi, New Hampshire, Rhode Island, New Mexico, Utah, and District of each have one member.

Massachusetts, Missouri, Ohio and Wisconsin, have three each, Pennsylvania four, while New York carries off the lion's share, viz.,—eleven, or almost one-fourth of the American delegation. Why New Jersey, with her many active photographic workers, should have been ignored, can only be explained by the presumption that whoever made the selections, in their ignorance labored under the delusion that New Jersey was not a part of the United States.

But even stranger yet is the treatment accorded the photographic press of the country; while our weekly contemporary, the *Photographic Times*, is represented in the advisory council by its nominal editorial staff of three persons; and *Anthony's Bulletin* and the *American Amateur* are each acknowledged in the persons of their associate editors, the three most important photographic periodicals in the United States, viz.,—*The St. Louis Photographer*, *Wilson's Magazine* of New York, and the *American Journal of Photography* of Philadelphia, are ignored entirely. Why this should be we do not know; perhaps Chairman Bradwell or his associates can explain. Personally we have no grievance, but, as our western brethren would say, the whole matter certainly looks as if there was an Ethiopian of exceedingly large proportions concealed in the wood pile somewhere.

In the selection of the foreign members a general drag net seems to have been cast over the photographic sea, and the name of every person known in connection with photography raked in to parade as a member of the advisory council of the committee

of the "World's Congress Auxiliary on a Congress of Photographers." The total number of foreign members named in the preliminary address, amounts to seventy-five, divided as follows, viz.,—

Sandwich Islands, China, Finland, Chili, Buenos Ayres, Australia,—each one member.

Italy, Sweden, Holland, India, Canada,—two each. Japan three, Switzerland four, Austria five, Russia six, Belgium seven, Germany eight, France nine, England seventeen. Another interesting item would be to know how many of this list have accepted the preferred honor.

It has been the expressed desire in almost every quarter that the coming exhibition be a success in every department connected with the photographic art, and it is to be hoped that whatever committee be in charge will act with wisdom, care and *impartiality*, having in mind the advancement of the art, irrespective of personal favoritism or sectional jealousies, that we may not have a repetition of the disgraceful conditions which marked the distribution of awards at former exhibitions.

—J. F. SACHSE.

Restoring Engravings.—It is often desirable to photograph old or rare steel engravings or copperplate prints which are yellow from age or are discolored by grease, stains of sulphate of iron, or other causes—blemishes which appear prominently in the photograph, and frequently mar the reproduction.

These annoying blemishes can frequently be removed from the original by a simple process, without running the risk of damaging the print, by simply soaking the print for about a quarter of an hour in warm water; then hold up to drain for about a minute, then lay face down on a sheet of blotting paper, leaving it to lie for ten or twelve hours until thoroughly dry. If all the grease or sulphate of iron has not disappeared repeat the operation.

When dry, put under pressure, and the print will usually come out perfectly bleached and restored, none the worse for the treatment, except with the possible loss of the plate-mark.

THE SIZE OF STOP TO USE.

BY W. K. BURTON, IMPERIAL UNIVERSITY, TOKIO, JAPAN.

SO MUCH has been written about "Sharpness versus Softness," and the like, that some apology is necessary for even referring to the subject again, and I should not do so but that, having expressed pretty decided views on the subject some three years or so ago, and having, after continual study of the subject since, had reason to modify these views considerably, I wish to have an opportunity of restating my opinion.

The views that I expressed when I wrote last on the subject were briefly that, in the case of a landscape, the principal object ought to be sharp, or nearly so, according to the taste of the artist, all reasoning tending to show that it ought to be as sharp as the best optical instruments could make it, but that objects nearer to or farther from the camera than this ought to be less sharp. My reasoning was that as, if in nature, we look on what is the principal object of the landscape, objects nearer or farther look "out of focus," we ought to try to reproduce this effect in the negative.

In the first place as to the sharpness of the principal object. I am more inclined than ever to think that, in most cases at least, this ought to be as sharp as it can be made in the negative at least. I say in the negative, because I admit that a charming effect is produced by the softening, or slight loss of definition that results from reproducing from a negative by certain processes. Thus to me the softness that there is in most pictures produced by intaglio copperplate photo-engraving is a totally different thing from the effect got by printing in silver, even on matt surface paper or in platinotype, from an ill-defined negative. The one effect is beautiful, the other, generally at least, is not. It seems to me that those whose taste leads them to avoid absolute sharpness in any part of a picture would find it best to get the softness they want in the after process of printing rather than in the negative. Mr. George Davidson has described various ways of producing such softness from a negative in which the definition is quite sharp.

Even if it is decided to get softness, or slight want of definition, in all planes of a negative, it is to be borne in mind that this softness may differ in quality. Thus the softness got by admitting an appreciable quantity of spherical aberration is quite different from that got by putting the whole of the picture a little out of focus. The softness got by admitting a little spherical aberration is of a much more pleasing kind than that got by putting the image out of focus. The reason is that, in the former case, the image may be said to consist of one of perfect definition, in the latter case there is nothing but lack of definition. It is for this reason that I have often stated that an optical desideratim is a landscape lens with an adjustment whereby a *large quantity* of spherical aberration can be introduced at will, so that what softness is wanted may be introduced even when a small stop has to be used on account of nearness of foreground objects.

Now as to making the principal object the sharpest (strictly speaking the most nearly sharp) in the picture, whether or not it be made absolutely sharp, I am afraid this is a doctrine that does not hold good. In the first place many pictures have no principal object, or no object of which it can be said with any degree of confidence that it is the principal object. Much more important, however, is the following fact: If there be any object in the foreground, the least conspicuous, even if it is not an object of particular interest, and if any more distant object be made sharper than this, the effect is distinctly bad. In other words, it is necessary to focus for the nearest object that is in the least conspicuous, apart from whether it be the principal object or not, and it very seldom is the principal object.

Now as to whether the rest of the view should be put distinctly out of focus or not. There can be only one object in putting the more distant parts of the landscape out of focus, and that is to give an impression of distance, the thing in which photography most commonly fails. The question is, does this leaving out of focus give the impression of distance or does it not? I have no hesitation in answering that there are cases where it does, and that there are cases where it does not, but where the only effect of leaving the distance out of focus is a totally unnatural one. If

this be granted the natural question is, In what cases is it of advantage to leave the distance out of focus, in what cases should it be sharply focused? To this I am sorry to say I can give no answer farther than that continual observation and experiment will educate the eye to be able to tell whether or not the idea of distance will or will not, in a particular case, be given by the use of a large stop. By experiment I mean the taking of two or more negatives of the same subject with stops of different sizes, no adjustment of focus being made between the exposures, and comparing the resulting pictures. This is a thing I strongly advise to those who wish to study this matter, which is of the utmost importance to landscape photographers. It may be asked, Why take negatives? the effect can be seen on the ground-glass. There may be some gifted enough to tell exactly what the print from a negative will look like by examining the image on the ground-glass, but I think they are very few. The difficulty arises from the want of light, except when a very large stop is used, and from the fact that it is all but impossible, as a rule, to see the image on the ground-glass as a whole.

There is one thing I incline to state, although with some diffidence. It is that, when the impression of distance is really rendered in any other way, as by the correct representation of atmospheric haze, there is no necessity to add an out-of-focus effect, and it is generally a mistake to do so.

There is another difficulty about leaving the distance out of focus. We have not the power of controlling to what extent the different planes shall be out of focus. The relative want of sharpness is purely a function of the distance. Thus, suppose we have a well-marked foreground, an object at a considerably greater distance that is distinctly the "principal object," and a "distance." The foreground, as has been stated above, must be made at least as sharp as any other part of the picture. The principal object may, perhaps, be made a little less sharp, but that is all. It may be desirable in this case to leave the distance quite appreciably out of focus, but this is generally impossible. If the "principal object be several times farther away than the foreground, and the latter be focused for, there will be no appreciable difference in

sharpness between the principal object and the distance. There are some cases where the difficulty may be got over by focusing for a plane between the foreground and the principal object, but they are exceptional.

Talking of foreground induces me to express the opinion that very few photographers seem to appreciate the importance of foreground—or perhaps they are debarred from making the best use of foreground by the extreme difficulty of treating it. I mean here, foreground quite close to the camera. We have only to look at the work of any good landscape painter to see what a power there is in foreground, at quite a short distance,—what an amount of relief it is capable of giving to a picture. Such foreground does not need to consist of important objects. A stem or a branch of tree, a bit of a road, a few agricultural implements, or a little foliage will do.

There are several difficulties in the case of rendering such foregrounds by photography. One is that of focus. This is especially felt in the case of large work, and where long-focus lenses are used. There is a certain class of photographer that is continually laughing at the *f*-32 man. Of course a man who makes a habit of using *f*-32, or any particular stop, in all cases, deserves to be laughed at, but if due attention be paid to foreground, I have no hesitation in saying that it is often necessary to use a stop much less than *f*-32 to get the foreground and the rest of the picture even fairly into focus. This brings another difficulty,—namely, prolonged exposure, and, as the most appropriate foregrounds for the work under discussion very often consists of foliage, which is very seldom still, the difficulty becomes serious. There is still one difficulty more, and that arises from the tendency that photography has to render such near foregrounds as I have been writing of too dark. This can often be got over by appropriate selection, in other cases by skillful manipulation of the lens cap. Only in some stereoscopic work done at the time that the stereoscope was so much used that the masters of landscape photography produced pictures of it, have I seen foregrounds treated as I here describe.

It seems to me that many of those who have no part of a photograph sharp fall into a certain error. They state that the defect of ordinary photographs is the want of "breadth." There is no doubt they are right here, but they seem to go farther. They appear to think that if definition be suppressed by having no part of a picture in sharp focus, breadth will result. But will it? In the first place is "breadth" of effect obtained by artists by suppressing detail? To a certain extent it is, but I think it is effected more by emphasizing salient points. But even so far as the detail goes, I cannot see that leaving the picture out of focus suppresses this detail. It only confuses it, and, in some cases at least, makes it more conspicuous than it otherwise would be.

How to get "breadth of effect" is certainly the great problem for photographers. Beyond selection of subject, and occasional manipulation of the exposure so that one part of the subject gets more than another, I can see nothing to be done but to "dodge" the negative in printing, sometimes by shading one part of it for part of the exposure, sometimes by working with pencil and stump on tissue paper stretched on the back of it. And I believe the purists, who are just those who most recognize the lack of "breadth" in photographs, consider this practice illegitimate.

However this may be, I wish to impress on landscape photographers that the very highest judgment can be exercised in deciding (1) what plane of a subject shall be focused for, (2) what stop shall be used. Indeed, the differences of effect that can be produced by varying these two factors alone are so great that it ought, I think, to entitle photography to rank as a high art.

One of the earliest efforts at the reproduction of ancient manuscripts, was the attempt made in 1856–7 to reproduce in fac-simile the *Codex Argenteus* of Ulfilas, the oldest sample extant of Gothic language, it dating from the fourth century, and is in the great mother tongue of the whole German race.

A NEW PLATINUM PROCESS.

BY P. GANICHOT.

AFTER numerous and varied experiments to prepare a good platinum paper, I finally settled upon the following method, which gives excellent results.

To prepare the sensitizing solution dissolve

Ferric chloride (dry), . .	25 gr.
In water distilled, . .	1,000 ccm.

Then filter and add a small portion of ammonia, until no further precipitate forms. This mixture forms a ferric hydrate in the shape of a reddish brown paste, which in turn is to be poured into a filterer and washed until the water ceases to taste salty, then dissolve

Oxalic acid, . . .	50 gr.
In water, . . .	150 ccm.

Bring this to a boil and slowly add the above ferric hydrate which will dissolve.

This solution should be a saturated one, and show no acid reaction. To insure absolute neutrality, it is therefore advisable to add a slight surplus of the ferric hydrate, which will remain undissolved.

Above solution is to be filtered, after which add

Chloro-platinate of soda, . .	25 gr.

and the volume brought up to 250 ccm. by addition of distilled water. In case this solution becomes turbid, it is necessary to again filter. The solution is now ready for use, and in the dark keeps for an indefinite period.

Any suitable matt paper, which has been previously salted with arrowroot or gelatine, will answer for the purpose, and can be sensitized in the usual manner by the use of a broad brush.

It is of primary importance that the solution be applied merely upon the surface and that it shall not penetrate into the paper, otherwise the prints will not be brilliant. After the solution has been evenly applied to the paper, the sheets are hung up to dry

Naturally the sensitizing and drying must be done in the dark room.

The exposure is made under a negative in the usual manner; after sufficient exposure the print is developed in the dark room in following solution, viz.:

Oxalic acid, . . .	25 oz.
Chloro-platinate-soda, . .	2.5 g.
Water,.	250 ccm.

The print gradually gains in intensity, and loses the reddish-yellow color of the oxy-ferric-hydrate which it shows after the exposure.

The presence of the chloro-platinate of soda in above solution is of importance, as it furnishes the platinum necessary to form the desired image, the quantity contained in the paper not being sufficient to produce requisite density. As soon as the image is intense enough, and before it becomes grey, it is to be taken out of the developer, washed thoroughly and hung up to dry.

As the print loses none of its density in the successive washings, it need not be developed further than actually wanted.

This exceedingly simple and cheap process gives artistic results and permanent pictures. It further gives pictures with fineness of detail without exaggerating the contrasts. Further, by the use of chloro-platinate of soda the necessity of extraordinary precautions against dampness is obviated, as it may be kept the same as ordinary albumen paper.

Finally, the process is a very economical one, notwithstanding the continual advance in the price of platinum; this is in consequence of the minimal percentage of the salt used in the preparation of the paper, a finished print costing but one-fourth as much as an ordinary silver-print of equal size, irrespective of the advantage of finer modulations and greater permanency.—*Bull. de la Soc. Franc. de Photo.*

It was Sir J. W. Newton who stated that the object should be taken within six feet from the lens, or it will appear distorted.

THE HIGHER REFINEMENTS IN DEVELOPMENT.

XANTHUS SMITH.

THE peculiar relations and tendencies of different nationalities to art would form quite an interesting study for any one who might feel inclined to prosecute it.

We see such markedly distinctive characteristics holding on to different peoples, or rather different races holding on to such widely different qnalities, that one feels curious to know what principles may be governing man's mode of seeing and portraying what he sees. The Chinaman makes a wonderfully different affair of a landscape scene from what a European does, and, the Chinese may be said to be an artistic people in one sense of the term, and with what we consider our nicer judgments we Europeans see wide differences in our own arts. The Germans, for instance, have the reputation of being harsh, inharmonious colorists, whilst their near neighbors, the Dutch or Flemings, are noted for their harmony of coloring. The English color beautifully, but are said to draw badly, and the French though fine draughtsmen may well be accused of adhering only to the trivial or the disagreeable in subject.

Up to some fifteen years ago, when we here in America prided ourselves on our nationality and individuality, we were running into a remarkable perfection in art. Owing, it would seem, to a lucky union of the various excellences of European art, conglomerate as we are, and new, there was in our school, if it might be so called, a complete breaking loose from old traditions, and a healthy going to nature which gave our work a freshness and truth which had not before been equalled, and had not the unfortunate check taken place through the whim of fashion, which has made it vulgar to be American in anything, especially in art, we would undoubtedly now have been one of the greatest of art people. Further, it has been the greatest misfortune that American art should have become French, because the French do not love landscape nature, and court the disagreeable in almost everything. They hate the grand and the beautiful in landscape art. Had Americans turned their attention in the direction of England, if they must

be foreign, how different would have been the influence. Englishmen love nature, they love beauty, and what is best of all they love all that is good and pure and high and holy in nature and art.

All must admit that truth is a prime quality in anything, and in art beauty and truth, we think, should stand first, and those people who give us the most beauty founded upon the most truth should stand highest.

But, it will be asked, "What has all this to do with photography?" This much, we reply. That the English love for truth and beauty in art, is certainly influencing English photographers in the direction of an elevation, and perfection in their branch of art, which must appeal acceptably to all those who have either actual knowledge or natural good taste in such matters.

We are all familiar with the efforts made in England, by the leading men in the photographic art, to elevate their work out of the mere mechanical, and always, we may say, with a fair knowledge of the capabilities and limitations of their means. In their genre compositions, and artistic effects in landscape, they lead against all other competitors, but to what we would now call particular attention, as showing their refined feeling for the highest excellence, is the attention that is given to the matter of the development of the latent image.

To those who have read carefully the leading British journals for the past year, the discussion which has been in progress, of the subject of the composition of the latent image, and its development, must have been particularly interesting. Certain statements made by Messrs. Hunter & Driffield, and the numerous criticisms of them by the most able investigators and workers in photography, show how keenly those refinements of the art which give it its most subtile beauties, are sought after and appreciated.

What may be called the building up of the image in the developing tray, by the action of certain agents is a subject of never tiring interest to the careful photographer, and especially to the amateur, who is supposed to be able to expend more time and pains upon each individual plate than the professional, who is generally hurried by large orders for work, and much depend-

ent upon his assistants. Nor is the amateur supposed to rely so much upon retouching, which in portraiture is often the sole dependence of the professional for the attainment of the variety of gradations which should exist in a good photograph.

A careful perusal of what has been written in the discussion upon development, referred to, will tend greatly to confirm the views already arrived at by careful experimenters. That we have great influence in development there can be no doubt. Of course the time of exposure given a plate is an exceedingly important consideration, so much so indeed that if we could expose our plates with certainty the precise length of time which they should be exposed, we could have perfect work with but little trouble in the after process of development, but, unfortunately, the latitude in exposing the most sensitive plates is so very small that the question of modification or improvement of incorrectly-timed plates in development becomes an exceedingly important one. We feel more than ever confirmed in the belief that a vast deal may be done in under- and over-timed work, of course omitting extremes, to produce a comparatively perfect result, by well advised management of the agents employed.

In the case of under exposure our aim must be to retard the building up of the lights while we are getting all the detail attainable in the shadows, and with over exposure to build up as rapidly as possible the lights at the same time retarding the veiling of the shadows. Of course it will be seen that in the one case we must get in the strongest work we can by the alkalies, sometimes even unaided until the last by the developing agent used, and in the other the alkalies must be kept in entire subordination to the pyro or hydroquinone or eikonogen as the case may be, at the same time giving full play to the bromide. By such care, we think, it will be found not only that the simple flatness or thinness of a negative or its over density may be corrected, but that the whole may be proportionately built up, all the nice gradations from the highest lights, through high-light, middle tint, and half-shadow to the deepest shadow being preserved, thereby securing those refinements of the art which constitute its greatest perfection.

OPTICAL GLASS.*

A MORE exact title for the paper would have been "Glass for Optical Purposes," although that is not a sufficiently precise definition, as all glass which we apply in order to see through it is, in a sense, "optical." But I should have to use a pretty longish term to define exactly what is meant by glass for optical purposes, and we may proceed to the more concrete part of our subject without leaving any doubt in our minds as to what we are talking about.

Antiquity of Optical Glass.

We know for a fact that optical glass was in existence before the Christian era; I do not mean to say that it was equal to Chance's dense flint, but being used "optically," it was optical glass—at least, in its application. Claudius Ptolemy, the Alexandrian astronomer, living about the second century B.C., wrote a treatise on optics, refraction and reflection, and on lenses and mirrors. Copies of his works are said to exist in the Bodleian Library at Oxford, and in the Royal Library at Paris. We are, therefore, not talking about a new thing, either as regards lenses or with regard to "optical glass." Other works of a similar kind exist, one of the best known being that of Roger Bacon, who, in the thirteenth century, wrote his *Opus Majus.* He has, in fact, been looked upon by many as the inventor of the microscope, and the telescope too. We are told where his "optical glass" came from.

You are all familiar with the story of how Galileo came upon the form of telescope which bears his name, but he does not possess the laurels alone, for we have it recorded that telescopes were made in the year 1600 by a Dutchman named James Metius, at Alkmaar, in Holland.

During all this time optical glass must have been procurable from somewhere. It is, however, very evident that the make of what we *now* understand by optical glass must be a modern thing, for it is evident that before Newton showed the different refrangibility of different parts of light, there could have been

* A communication to the London Photographic Club.

little room for such an establishment as the one now in existence at Jena, where glass can be made to order with a given index of refraction calculated beforehand to the third and fourth decimal for any part of the spectrum.

What is Optical Glass.

Glass was made, we know, something like 1600 years before the Christian era in Egypt, and, as it was soon ground into lenses, it must have been "optical." When glass becomes so pure that we can speak of its refractive indices, and of its spreading or dispersing the light in regular or even measurable ratio, we look upon it as optical. The crown and flint glasses, so called, are those we use for optical purposes. Crown glass is a plate glass, or *vice versa;* flint is a glass charged with lead. That for optical glass the finest and purest of materials must be used goes without saying. White sand is used, pearl ashes, borax, cobalt, manganese, and other ingredients, and as a matter of fact, hardly any glass is made without the addition of some pieces of broken glass of the same kind. Flint glass is also made of fine white sand, red lead, fine pearl ashes, nitre, arsenic, and manganese. Many of the modern optical glasses contain other additional substances, which I shall refer to later on. Flint glass was formerly made from flint ground up; but I understand it is not used now.

In England, Chance Brothers, of Birmingham, have for years produced some fine specimens of optical glass—notably, their heavy flints; and in France, Feill, of Paris, has made glasses in many instances exactly of the same character. In Germany nothing was produced on any large scale since the death of the great Frauenhofer in 1826—who made his own glass—until lately, when, after some experiments, carried on during a number of years, the scientific world was taken by storm with a series of glasses such as we had never had before, opening up new means of improved construction for all sorts of optical instruments, notably also the ones that will interest you most—the photographic objective.

It is very evident that, as far as the manufacture of optical glass on a truly scientific basis is concerned, there was much left to be desired by the state of things up to 1885 or 1886, and there was no means of eliminating certain errors of a chromatism entirely even from the finest instruments of the most renowned makers.

Several attempts had been made, notably in England, to bring about a more satisfactory state of things, and after the work of Frauenhofer had been cut short an Englishman, Harcourt, made experiments between 1834 and 1860, in all about 160 different pots, but he had not the technical assistance necessary; and, apart from some attempts which seemed to point in the right direction, he wasted much time in making glass containing titanium. This glass, which he principally made with a view of eliminating the secondary spectrum, did not answer, but it showed the possibility of getting rid of this secondary spectrum once the right material was found and applied in the right way.

Abbé and Schott's Experiments.

Professor Abbé is said to have come to the conclusion that the then existing state of things with regard to optical glass specially for microscopes could only be remedied by the creation of entirely new materials, and he gained this conviction after a visit to the exhibition of scientific apparatus in London in 1876. He communicated with Dr. Schott, who then lived in Hanover, and the idea of creating a new establishment for the production of improved optical glasses was accepted by both.

The principal object was to produce such glasses as would allow the elimination of the so-called secondary spectrum from the objectives, especially from the microscope, the instrument which suffered more than any other from this defect. Experiments were begun in 1881, and conducted on a small scale until 1883. From that date experiments on a large scale were undertaken, and with the help of some 60,000 marks contributed by the Prussian Government from the fund set apart for scientific research, many new kinds of glass were experimentally produced which, in combination with others of the known or of new

kinds, would allow of combinations in which the chromatic or spherical aberration could, to a great degree, be corrected, and the secondary spectrum be almost eliminated.

This is accomplished by improved crown and flint glass mostly with mixtures of boracic or phosphoric acids, while greater variety in the refractive and dispersing powers of the glass was obtained by applying baryta, magnesia, and zinc oxides. Thus, up to now, something like eighty different kinds of glass have been put on the market, and experiments have extended to more than 1000 kinds of glasses or compositions of glass.

The materials that have finally been adopted are several series of new glass, as the phosphate crowns, barium phosphate crowns, boro-silicate crown, barium silicate crown, etc., borate flint, boro-silicate flint, a special silicate flint, and a light baryta flint.

Advantages of the New Glasses.

The great advantage which the constructing optician has gained by the establishment of this furnace is, that he can obtain any of the glasses enumerated in the catalogue always alike, and with increased precision for the measurements of the refractive indices. Nay, more, he may require a glass slightly different in refraction at one or the other part of the spectrum, and he can obtain it; but the variety is in itself so great that for almost any special purpose a glass will be found that will answer. Moreover, formerly, every batch of glass turned out had to be examined in the spectrometer, and its refractive indices ascertained, while now they are precisely given for every pot, as well as the amount of dispersion for the principal parts of the spectrum, and the specific weight. As most of you know, the usual mode of specifying glass is given by the refractive indices of the sodium line D (double line), and of the three hydrogen lines, C, F, and G. The measurements at Jena are, however, also made on the line A, the potassium double line, so that their measurements are made on five lines of the spectrum, A, C, D, F, G.

Their catalogue indicates for every kind of glass—the refractive index for D, the brightest part of the spectrum, the mean dispersion from C to F, following which is given the proportional

or relative dispersion. The glasses are enumerated in order of this last factor, which allows at a glance a comparison of the refractive and dispersing values of glasses to be combined.

I found, some years back, that in some heavy flints made by Chance these indices agree exactly with some glass of the same kind made by Feill, of Paris, so closely as to show the same figures up to the third decimal. If you had asked any of these makers to make two pots of glass exactly alike to that degree they could not have done it, or, at least, could not have guaranteed it to come out absolutely the same. Hence a new batch of glass had to be studied spectrometrically before much else could be done with it, and much of that labor is saved to the constructing optician by the precision in which the Jena people specify their productions.

Such a profusion of new material is a great boon to the constructing optician who has been hampered by the insufficiency of the material at hand formerly because of the impossibility to fully achromatise with flints and crown glasses, or even with two flints combined, because of the disproportionate dispersion of most, if not all, the heavy flints, as compared with crowns or of light flints. Many of the new glasses combine much better, and the result is that lenses can be constructed giving much flatter fields with the same angular apertures and better achromatism into the bargain. When the combined glasses allow the achromatising in three different parts (colors) of the spectrum, the so-called secondary spectrum is said to be eliminated, and the correction is for most purposes complete. This is of great importance in microscopic lenses, but for photographic lenses it is of less consideration.

Identity of Jena and English Glass.

We find that at Jena they now produce exactly the same glass as the former glass made by Chance Bros., as, for instance, their No. 8, which we learn to be a "calcium silicate crown." There is another, No. 12, also corresponding to Chance's "soft crown." It is a "barium silicate crown." Their No. 38 again corresponds to Chance's extra dense flint. They call it "heavy silicate flint."

And finally, No. 40, another heavy silicate flint, corresponding to Chance's double extra dense flint. You will see that all these flints have a high index of refraction for the D region of the spectrum, such as 1.7174 for the least, and 1.65 for the former.

You will see by a perusal of the Abbé-Schott catalogue, that for photographic purposes mostly the silicate crowns or flints are useful, and also some of the baryta flints, most of which are colorless, or nearly so, while the *borate flints* are not to be employed for photographic purposes, on account of their being affected by the atmosphere. They will, however, be valuable for the microscope, where they can be protected by another kind of glass forming the outer lens or lenses.

Some Properties of the Jena Glasses.

The glasses which have proved to be of great value to the photographic optician and photographic purposes generally, are the baryta flints, on account of their proportional high refraction, that is, a refraction of a considerable angle. This permits of lenses being ground with much flatter curves, inner and outer, and the result is a much flatter field obtained at the focal plane. As an instance I can mention Suter's new rapid aplanat D, which is made of such glass, and was, in fact, one of the first lenses manufactured out of this material, the curves of which are much less deep than any lens previously made of such intensity, viz., *f*-5.5, No. 2 u.s.

Voigtlander had made a lens of nearly the same angular aperture previously, but I do not believe they were kept going for any length of time, and the series have disappeared from their catalogue or are replaced by lenses of a newer construction. Suter had, in fact, made a lens previously of the same aperture (*f*-5.5, No. 2 u.s.), of which there were issued some few; but they were dropped in favor of the new construction which the Jena glass permitted, and a great gain in even illumination, rapidity, and flatness of field was the result, besides a much more complete correction of chromatic aberration. Dallmeyer had also once produced a lens said to have almost double the aperture of a rapid rectilinear, but it was not, I understand, issued on the

market. I am, of course, speaking of cemented double combinations, not of triplets or lenses with separated back glasses.

These attempts of opticians to construct lenses with greater apertures, and so few faces only, were frustrated simply on account of the want of suitable material. Now that the material is at hand, no difficulty exists, and in the hands of our able opticians plenty of these instruments, of excellent quality, are produced. The usual objection which was made as to using the new material, the one that it did not keep, has now pretty well been silenced, and English opticians, after some hesitation, have begun to use the material freely, and will no doubt produce excellent instruments from it.

The values of the several series of new glasses have been ably brought to the practical tests by the Zeiss anastigmats, which are now largely manufactured, and for which license has been granted to a number of leading opticians, such as Voigtlander, Suter, and, in England, to Ross & Co. These lenses accomplish successfully what was, with the material previously at hand, tried repeatedly, but not with good results, viz., a lens of the rapid type, that is, with an aperature of *f*-8 and larger, which at the same time can be used as a wide-angle lens, and which, with the full aperture, already embraces a covering angle of about 60°, as is the case in the Series III.

Manufacture of the Glass.

With regard to the manufacture of the glass, it would be a vain attempt to write a description without a good set of illustrations; but some idea may be gained of the nature of the operations when we are told, for instance, that the making of silicate glass will take close on to three weeks. The pot, or crucible, in which the glass is to be "cooked" is, after being well dried, heated during four or five days until it attains a red heat; it is then put into the oven where, as soon as it has reached the temperature of melting glass, a few pieces of glass of the kind to be made are put into it, and as they melt the inside of it is well glazed out with the molten glass.

The crucible is now filled with the sand and chemical substances that are to make the pot of glass to be produced. When this is thoroughly melted and worked into a homogeneous mass the crucible is brought to a greater heat still, which is supposed to thoroughly digest the glass and drive all the air out of it. This lasts six to eight hours. The glass is now tried, after being thoroughly stirred with a rod, and found homogeneous and free from air bubbles and clear. It is then tried on the blow-pipe. If the pot proves to be in good condition it is taken out of the oven by a crane,—it may weigh some fifteen to twenty cwt., or about a ton. It is then left to stand and "gently simmer" so as to cool down a little, is then brought into another oven, in which a second crucible has undergone the preliminary warming process, and which is intended for the next pot of glass of the same or a slightly different composition. In this oven the glass is left about three days to cool; the contents harden up—dry up—as the melters say, and on "drying," or hardening, break up into a number of fragments.

The crucible is now broken up and the contents cleaned of any impurities. The clear, transparent pieces are next subjected to the "setting" process. By this they are heated to about melting point, having been laid into moulds, where they adopted the desired forms of discs or slabs as required. This is done in a special oven, to which a cooling oven is attached. The cooling takes ten to twelve days, and the pieces are finally taken out, and two edges or faces are cut, so that through the polished surfaces —which, as you see in the samples, are always opposite to one another—the glass can be examined. The net result of usable glass amounts to about twenty per cent. of the quality melted in a pot, and that is considered a good percentage.

This is the ordinary procedure for the bulk of glass intended for ordinary purposes. For special glass, such as large telescope object-glasses, a special process of cooling is employed, of which I can give you no special information: but a circular of the firm of Shott sets out some points of examining discs of sizes up to, say, fourteen inches, and for which they have adopted what they call fine annealing, which consists in storing the glass in a vessel

the temperature of which can be accurately measured, and which is made to cool down at a very slow and uniform rate, and can be regulated according to requirements.

Testing the Glass.

Most of you may be acquainted with the mode of testing such discs or lenses by use of the Nicol prism. It consists of placing a lens or disc of glass, or a plate, between two polarizing prisms, rotating the one until the light is polarized, and then observing the more or less regular figure of a cross on the disc; the regularity of the cross proves the homogeneousness of the glass. An irregular cross will be proof of tension in some parts of the disc.

It now remains only to put before you some samples that I have here to show, most of all of which are suited for photographic objectives, and all of which, I am told, may be looked upon as unaffected by the the atmospheric influences. Most of these glasses are almost free from color, and you will see that a number of them are light flints, which now take the place, in a degree, of the former heavy flints, by which alone the high index of refraction necessary for some instruments could be obtained. This is, as I have shown, a great gain.

Lieut. Peary, the Arctic explorer, and his heroic wife, whose portraits we gave in our last issue, have since returned to Philadelphia from the frozen North. During his sojourn in the Arctic Circle, a No. 4 Kodak was his most constant companion, even while on the sledge trip of over 1500 miles across the Northern ice-cap of Greenland and return. The 82 parellel was the most northern point reached by Peary and his solitary companion, and marks the farthest limit thus far brought under the influence of the camera, and the sensitive films of modern photography.

Over 1,300 exposures were made by the intrepid explorer during his memorable sojourn in the land of the Eskimo and polar bear. These films are now being developed by a Philadelphia photographer, and we trust will add much to our knowledge of the appearance of life in the frozen North.

AIMLESSNESS.

BY F. C. LAMBERT.

IN looking over an ordinary collection of miscellaneous photographs one is very apt to be impressed, and depressed, by a general feeling of weariness, accompanied by the consciousness of being surrounded and bathed in an atmosphere of misspent energy.

To put it briefly, one feels that the game bagged is not at all proportionate to the powder expended. And pondering over this matter it seems to be due more to want of aim rather than bad shooting; reminding us of the fisherman's friend who observed that "that those people who aim at nothing generally hit it."

To take the average case of the ordinary photographer, who loads up his double backs and sallies forth for his day's outing, one may ask, "What are his aims?" Gentle reader, we may ask, but for answer echo only answers "What?"

The fatal facility of modern processes tempts many a one to burden himself with many pounds of baggage, tramp many weary miles, etc., etc., "on the chance of something turning up," usually with one of two results.

In the first case, the laborer is anxious to be "at it," and fires away at the first rustic bridge, or milestone, or other thrilling object he finds.

The half-dozen plates are soon "polished off," and then, perhaps, sets in a wave of doubt, not to say repentance.—*e. g.*, "Wish I 'd saved a plate for this." "Half think that last plate won't be up to much." Or, on the other hand, our more lethargic friend is tardy in beginning. "Don't see anything worth doing hereabouts;" but having carried his burden so far, he does not feel inclined to return empty-handed. "Must use the plates, you know;" and so he "takes" anything, "just to use the plates." In both cases our friends have aimed at nothing and hit it too.

"Now, it is easy enough to criticise and to talk," say our friends, "but, what would you have us do?"

Firstly, then, let us remember this truism. If we fail to see any reason why we exposed this or that plate, it is hardly to be

expected that our friends will see very much in the resulting print, except it be a warning not to rely too much on chance firing.

Secondly; if a man goes out picture hunting, and has little or no idea what to look for, he has not much chance of finding anything of value; or rather, if he does stumble upon something really beautiful, there is but slender chance of his perceiving its beauty.

Now, despite all that has been said against set subjects (much of this being true enough), it still remains that a list of suggested subjects would, with many otherwise aimless workers, have at least the effect of helping them to keep their eyes open.

It seems to be a growing opinion among those who ought to know from experience, that club outings—*i. e.*,"photography in bulk"—usually consist of about equal parts of fooling and feeding. Whereas, had the party of, say, a dozen, been split up into six couples, the results would be more worth preserving. In addition to this, it might be suggested that if one or two members who knew something of the district to be visited would place their experience before those members who intend joining the expedition, and then the whole party agree upon, say, some half-dozen general ideas to be kept in memory, then while each would be free to follow his own bent (if he had one), he would also be on the lookout for, and seize upon, any scene which to *him* seemed capable of expressing any of the suggested ideas. Finally, to give interest to the suggested subjects, an evening being appointed, members should then bring up prints, or show slides, and discuss the success or failure in carrying out the main idea. In some such way every worker would learn something from each of the others who had anything to compare with his own work.

Now while admitting that we cannot make pictures like puddings, *i. e.*, by receipts, yet the fact that we were put upon our mettle to give the best suggestion of, say, industry, solitude, wind, etc., would have a wonderful effect in sharpening the eyes of many who would be otherwise just "snapping off a few plates for the fun of the thing." To take the first of these suggested ideas,

one may well imagine a dozen very interesting and totally different pictures almost equally well expressing this theme. The comparison of, with a friendly discussion upon, these attempts would yield abundant material for a most interesting meeting, in which every one of the dozen workers would learn something from each of the eleven others. It may be urged that there is a dearth of subjects, or that English people and places do not lend themselves to ideal treatment. This is a confession of incompetence rather than lack of material. It is enough to refer to our native poets and their pastoral subjects. It will suffice to quote perhaps the best known of English pastoral word-pictures, *viz.*, Gray's Elegy. Painters find in it endless suggestions; why not photographers?

Laying aside the idea of working out an idea, or, rather, expressing thought pictorially, there is yet quite another direction in which much good work cries out to photographers, *viz.*, systematic, careful work along a definite line.

The present writer has a friend who year by year spends his holidays in a different cathedral city, and in that way is making a splendid collection of most valuable work. The building as a whole is carefully studied from various points of view, suitable lighting chosen, etc., and, added to this, numerous detail studies are made with the utmost care.

One may well imagine an interesting collection of pictures to be made by thoughtful working along a certain river or dale; or, following the great Turner's lead, one might do worse than study the harbors of England.

This much, however, will scarcely be disputed, *viz.*, that it is better to have ever so humble an aim, even to descending to what one very high art teacher affects utterly to despise and contemn under the name of "mere topographical things," than to have no aim at all. A simple tale simply told is to not a few quite as interesting as the high-faluting, grandiloquent rhapsody of a pictorial Hamlet.

—*The Photographic Review of Reviews.*

OUR CURRENCY.

THERE are in the United States so many kinds of currency, that it is not strange that misapprehensions and a confusion of ideas should exist on the subject at home as well as abroad. First in order is the gold coinage, the basis upon which the whole circulation of the country rests. Should this become weakened the entire system would be likely to fall into confusion. The gold dollar is the only recognized legal "unit of value." By it only is measured the value of all foreign coins and bullion, whether of silver or gold. That the gold dollar rests on its own basis independently of government fiat, is seen by the fact that gold bullion is of the same value and performs the same function as the gold coinage in monetary transactions. The case is very different with the silver dollar and silver bullion. According to the latest estimate of the director of the mint, the stock of gold coin and bullion in the United States, including the coin in the treasury vaults, in the banks and in circulation, amounts to $687,000,000. As nobody can tell how much gold may be stowed away in stockings and other hiding places, this estimate is largely based upon conjecture so far as the gold in private hands is concerned.

Next come the standard silver dollars, of which a little more than $57,000,000 is in circulation, and about $357,000,000 is piled up in the vaults of the treasury. Upon this coinage, authorized by the act of 1878, about $327,000,000 in silver certificates are in circulation. The small remainder of silver certificates is in the treasury, to the amount of about $4,000,000. These certificates are legal tender for taxes, custom-house duties and other demands of the government. Under the act of July 14, 1890, no more of this class of silver certificates can be issued.

The greenbacks, the remainder of the legal tenders issued during the war, amount to $346,681,016, of which about $100,000,000 constitutes a portion of the reserve of the national banks. These greenbacks are a floating debt of the government, and while their amount cannot be increased, they may be issued and reissued as fast as returned to the treasury. For their redemption $100,000,000 in gold is held as a treasury reserve.

The national bank notes amount to $172,476,575, of which $168,067,089 is in circulation. The rest is "cash" in the treasury. While the national bank notes are not a legal tender in general, the national banks must accept them at par for all demands. This makes them legal tenders for all practical purposes.

Under the act of July, 1890, new silver certificates to the amount of $105,000,000 have already been issued for the purchase of silver bullion, of which upward of $100,000,000 is in circulation. They are legal tenders for all debts, public and private.

Of the gold certificates, of which $175,644,879 has been issued, $153,000,000 or thereabouts is in circulation; but most of this issue serves as a convenient reserve for the banks.

The subsidiary silver coinage amounts to $77,433,950, about $63,000,000 of which is in general circulation, and the rest is stored in the treasury vaults. This coinage is legal tender for no greater sum than five dollars.

Lastly, there are the current certificates, under the act of 1872, amounting to $30,550,000, nearly all of which are in general circulation.

This makes nine different kinds of currency, the total sum of which on the 1st of July, 1892, amounted to $2,241,096,694. Of this amount $1,529,316,833 was in circulation on that date, and $627,524,450 was in the treasury. This whole fabric of currency rests upon gold as its base—in theory, at least, if not in fact. Whether the enormous volume of silver and of paper certificates upon this silver can be kept at par with gold will depend on the future policy of the government. If unrepealed, the bullion act of 1890 will sooner or later bring the currency to a silver basis.

An Old Method for mounting photographs, and which it was claimed absolutely prevented the fading of the prints, was to first coat the back of the prints with a solution of gutta-percha in benzole, a mixture which dries in a few minutes. The print was then attached to the mount with a paste made of gum-dragon and water. The theory of the process was that the coating of rubber prevented decomposition of the paste, or deleterious chemicals from affecting the silver print.

PREPARATION OF PURE SILVER NITRATE FROM SILVER RESIDUES.

THE silver residue, which is assumed to be chloride (or is previously converted into chloride), is treated, according to a method recently given by R. Dietel, in the following manner:

It is first reduced to metallic silver in the usual way by means of metallic iron and dilute hydrochloric acid. Since chloride of silver is somewhat soluble in hydrochloric acid, the whole of the latter must be combined with iron. When the reduction is completed, the metallic silver mixed with the excess of the metallic iron is washed until the washings no longer show a chlorine reaction. The metallic mixture is now dissolved in nitric acid, producing a solution of ferric nitrate and silver nitrate, which is divided into two uneven portions. The smaller one of these is heated to boiling, precipitated by soda, and the precipitated oxide of silver washed on a filter until every trace of alkali has disappeared. The larger portion is evaporated to dryness, and then carefully fused so as to partly decompose the ferric nitrate present. When the mass is in quiet fusion it is allowed to cool and treated with water, which dissolves the silver nitrate and leaves ferric oxide behind. Next, the solution is mixed with a little nitric acid, to convert any silver nitrite which might have been formed into silver nitrate. Should it be still colored from the presence of some undecomposed ferric nitrate, the solution is boiled and treated with the silver oxide obtained in the first operation, until all the iron is precipitated as oxide. The solution is now again evaporated to dryness, the residue dissolved in water, the solution allowed to deposit suspended matters, then filtered, and finally concentrated to the point of crystallization.—After *Pharm. Zeit.*, No. 2.

Eleven hundred years before the Christian era the Chinese were printing dictionaries, and yet to this day they have not words enough in their language to adequately express their contempt for American politicians.

THE VELOCITY OF LIGHT.

LIGHT moves with the amazing velocity of 185,000 miles a second, a speed a million times as great as that of a rifle bullet. It would make the circuit of the earth's circumference, at the equator, seven times in one beat of the pendulum.

For a long time light was thought to be instantaneous, but it is now known to have a measurable velocity. The discovery was first made by means of the eclipses of Jupiter's satellites.

Jupiter, like the earth, casts a shadow, and when his moons pass through it, they are eclipsed, just as our moon is eclipsed when passing through the earth's shadow. Jupiter's shadow far surpasses in magnitude that of the earth. His moons revolve around him much more rapidly than our moon revolves around the earth, and their orbits are nearly in the plane of the planet's orbit. Consequently they all, with the exception of the fourth and most distant satellite, pass through the planet's shadow, and are eclipsed at every revolution.

Roemer, a Danish astronomer, made, in 1675, some curious observations in regard to the times of the occurrences of these eclipses. When Jupiter is nearest the earth, the eclipses occur about sixteen minutes earlier than when he is most distant from the earth. The difference in distance between the two points is about 185,000,000 miles, the diameter of the earth's orbit, or twice her distance from the sun.

It takes light, therefore, sixteen minutes to traverse the diameter of the earth's orbit, and half that time to span the distance between the sun and the earth. Light is thus shown to travel 185,000 miles in a second, and to take eight minutes, or, more exactly, ·500 seconds, in coming from the sun to the earth.

It follows that we do not see the sun until eight minutes after sunrise, and that we do see him eight minutes after sunset. When we look at a star we do not see the star as it now is, but the star as it was several years ago. It takes light three years to come to us from the nearest star; and were it suddenly blotted from the sky, we should see it shining there for three years to come.

There are other methods of finding the velocity of light, but the satellites of Jupiter first revealed its progressive movements.

WHY THE HOURS AND MINUTES ARE DIVIDED INTO SIXTIETHS.

IN the work of time notation, the mechanism of timepieces is so constructed as to make 60 divisions of each of the 60 minutes constituting an hour. No doubt people often wonder why our hour is divided into those 60 minutes, and that the latter also contain the same number of subdivisions each. The answer may be given in this way: That it came from a curious combination of systems of notation in ancient Babylon. In that great center of ancient civilization there appears to have existed, by the side of the decimal system of notation, another system, the sexagesimal, which counted by sixties. Why that number should have been chosen is clear enough, and it speaks well for the practical sense of those ancient Babylonian merchants. There is no number which has so many divisions as 60. The Babylonians divided the sun's daily journey into 24 parasangs, or 720 stadia. Each parasang, or hour, was divided into 60 minutes. A parasang is about a German mile, and Babylonian astronomers compared the progress made by the sun during one hour, at the time of the equinox, to the progress made by a good walker during the same time, both accomplishing one parasang. The whole course of the sun during the 24 equinoctial hours was fixed at 24 para sangs, or 720 stadia, or 360 degrees. The system was handed on to the Greeks, and Hipparchus, the Greek philosopher who lived 150 years before our era, introduced the Babylonian hour into Europe. Ptolemy, 300 years later, gave still wider currency to the Babylonian way of reckoning time. It was carried along on the quiet stream of traditional knowledge through the middle ages, and, strange to say, it sailed down safely over the Niagara of the French revolution. For the French, when revolutionizing weights, measures, coins and dates, and subjecting all to the decimal system of reckoning, were induced by some unexplained motive to respect our clocks and watches, and allowed our dials to remain sexagesimal—that is Babylonian—each hour consisting of 60 minutes. Here we see the wonderful coherence of the world, and how what we call knowledge is the result of an unknown tradition of teaching descending from father to son.

The Editorial Dropshutter.

THE FIRST DAGUERREOTYPE PORTRAIT. — The *Manchester Guardian* (England), of August 19, 1892, publishes a lengthy editorial in which exception is taken at our statement that "Robert Cornelius, of Philadelphia, obtained the first picture of a human face by Daguerre's process in the world, *November*, 1839, in Philadelphia," the *Guardian* claiming the honor for Professor John William Draper, who was a native of Lancaster, England, but who emigrated to the United States in 1833.

The conclusions of the *Guardian's* leader are based upon the summary of our historical retrospect, as published in the *Public Ledger* of Philadelphia, August 11, 1892, under the title "Dawn of Photography." Had the *Guardian* writer read the retrospect in full as published in the *American Journal of Photography*, he would not have fallen into the error.

By reference to page 243 of our present volume it will be seen that special pains are taken to disclaim any attempt to detract from Professor Draper any honor justly due him in the field of photography. However, as to obtaining the first portrait, the facts of the case are incontrovertible, and all against Professor Draper. In the third and fourth papers, on pages 361 and 403 of the *American Journal of Photography*, the details of Professor Draper's experiments are fully set forth, and by reference to the authorities quoted, it will be seen at once that Professor Draper's first crude attempts at portraiture were some months after the perfect Daguerrean miniatures of Cornelius were shown before the American Philosophical Society, at Philadelphia, as is attested by the minutes of *December* 6, 1839.—J. F. S.

THE HELIOCHROMOSCOPE.—The researches and experiments in heliochromy of Mr. Fred. E. Ives of this city have culminated in the production of a compact and portable apparatus in appearance somewhat like the parlor stereoscope. In this apparatus the views are seen through a large magnifying eye-piece in the exact colors of nature, by light entering from without.

Mr. Ives in his descriptive circular states, viz.: The heliochromoscope is an optical device in which a special triple photograph, which may be called a chromogram, reproduces the light and shade and colors of nature as readily and as perfectly as the phonograph and its phonogram reproduce sounds.

As the phonogram is a mechanical record of sounds, so is the chromogram a photographic record of light and color. As the phonograph translates the mechanical sound-record into sound, so does the heliochromoscope translate the photographic color-record into color.

The chromogram is a photograph made in a special camera, with no more operations than are required to make an ordinary photograph, but consists of three images instead of one, and in the production of these three images the light, acting through selective color-screens, registers its colors by making the lights and shades of the three pictures represent the relative effect upon the three fundamental color-sensations, according to the modern theory of color-vision.

Six chromograms accompany each apparatus. Extra chromograms of varying subjects may also be obtained. A special lamp for night illumination is also furnished.

A MAMMOTH CAMERA.—Mr. Charles H. James, a professional photographer of Philadelphia, who is also an ingenious mechanic, during the present year built himself a camera for large railroad work and interior photography, which would give panoramic views 24x36 inches with out any curvature in the foreground, and be actually true and rectilinear in every way.

The frame of this camera is made of mahogany, and measures 45x50 inches, and has an extension of 60 inches. The bellows are covered with morocco, eight goat skins being used in its construction ; it is built on the front focus principle. The weight of the box, independent of the two trestles which support the bed, is over 150 pounds.

The double plate holder used weighs over 25 lbs. empty, and when loaded with two plates, tips the scales at between 75 and 80 pounds. Mr. James, to obtain a perfectly plane surface, uses heavy French plate glass, which is coated to his order.

The lens used in this photographic monster is a Bausch & Lomb, Zeiss astigmat, 24 in. eq. focus, covering an angle of almost 90°.

THE HELIOCHROMOSCOPE.*

BY F. E. IVES.

IT was in 1888 that I first described and demonstrated, at the Franklin Institute, a method of reproducing the natural colors by photography, which differed in certain vitally important particulars from somewhat similar processes which had already been carried out by Cros and Du Hauron in Paris, Albert in Munich, Bierstadt in New York, and others. I succeeded in reproducing the natural colors in landscapes and various objects with a degree of accuracy which I have good reasons to believe had never before been approached by any method without the intervention of the artist's brush. The procedure was, however, too complicated and difficult for profitable commercial application, and comparatively few specimens were made.

I now present to your notice devices which so greatly simplify the operation of the process as to make it quite possible to place it in the hands of even the "press-the-button" class of amateur photographers, and yet yield results that are no more defective in color-rendering than the ordinary photograph is in the rendering of monochrome light and shade.

The first of these devices is a camera attachment by means of which the three pictures representing the effect upon the fundamental color-sensations are made by a single exposure on a single sensitive plate, and from a single point of view. The device as now perfected is surprisingly simple, being comprised in a small box which may be attached to the front board of an ordinary camera. The division of the light-ray is effected by transparent mirrors, as in some of my earlier cameras, but in such manner as to dispose the images symmetrically on a single plane, without altering the position of the camera in relation to the object.

The second device, which I call a heliochromoscope, contains the same arrangement of mirrors, turned about so as to serve to recombine the three photographs in such manner that the photographic color-record is translated into color again as readily as the sound record in the phonogram is translated into sound in the phonograph.

The most important advantage of this device is that it may be used at any time, at a minute's notice, like the stereoscope; and as almost everybody may possess one it is competent to make the realization of color-photography a household affair. It also more completely fulfils the theoretical conditions of success than either the production of color-prints or lantern projections, and produces an illusion of nature more perfect than would be possible with even an absolutely-perfect color-

* Read before the Photographic Society of Philadelphia, October 12th, 1892.

print on paper, because the picture is seen without surface reflections or distracting surroundings.

I claim for this system of color-photography that it is perfectly rational and scientific, and a true solution of the problem of reproducing the natural colors in a photographic picture. This claim meets with a good deal of opposition in the minds of some people, whose mental attitude is a source of wonder to me, because the same sort of objections that are made to the triple photograph would apply to the stereogram and the phonogram. One is an automatic record of color, another of binocular vision, and another of sound; each must be placed in a special device in order to reproduce that which it has recorded,—the triple photograph or chromogram into the heliochromoscope, the stereogram into the stereoscope, and the phonogram into the phonograph. I do not remember ever to have heard the stereogram denounced because it is not a single print with embossed relief, or the phonogram because it has no lungs.

Some even go so far as to deny that this can properly be termed color-photography at all, although the same individuals are in the habit of calling pictures that cannot be made to show colors "orthochromatic" or correct color photographs. But the most extreme illustration of this peculiar attitude of the mind that I have seen, is the assertion of one who, if I am not mistaken, has aspired to be the historian of photography, that this is merely "looking at ordinary photographs through bits of colored glass!" To be consistent, this writer should describe the stereogram as "two ordinary photographs mounted on the same card," and the phonogram as a "wax cylinder having a roughened surface like an ordinary file." I believe he did recently write a history of photography, with "an introduction to its latest developments," without once mentioning color-sensitive plates.

I speak of this kind of criticism because it comes from men whose writings are in demand, and proves the existence of a deep-seated prejudice, which I have encountered in the development of other applications of photography, and which must be combated in order to overcome it. I will give an illustration: When, in 1880, I succeeded in realizing a mechanically accurate and practical method of half-tone block-making, I could find only one engraver who believed that there was a future for processes that rendered the shading in equally spaced graduated lines and cross-lines. Engravers, printers, publishers and photographers were agreed that if a block be made of lines, those lines must follow the contours of the object depicted, as in the conventional wood-engraving. Since that could not be done, a grain similar to

the well-known lithographic-grain, must be substituted for the line-tint. I declared that the objection to a regularly-lined tint was a prejudice, stuck to it, and already, within twelve years, plates having that same lined tint have come into such extensive use as to replace millions of dollars' worth of engravings. They are used in illustrating books and periodicals of the highest class, and the advantages of the mechanical-lined tint are such that it threatens even to invade the domain of photogravure. Mr. Louis Levy exhibited such results at the last monthly meeting of the Franklin Institute, and I myself applied for a patent on a printing-plate of this character more than a year ago, having first experimentally demonstrated certain important advantages which they can be made to possess.

We did not make half-tone printing-plates of the kind that engravers and printers and publishers thought they must have, but they have concluded to take what we make, and are taking them more and more every year.

We have not made photographs in the natural colors of exactly the kind that people have been looking for, and there is good reason to doubt if such a result will ever be accomplished; but we have actually realized, by a process almost as simple as stereoscopic photography, results better than can even be hoped for in color-prints, and so perfect that they must ever represent the standard which results by any other method must be made to approach in order to be acceptable. A good many people seem to think that this is not what they want; but I have quite as much faith in the future of the heliochromoscope as I ever had in the future of half-tone block-making in line. It has been a revelation to me, and I believe it will be to the whole world. I met a professional artist in London, a clever painter of both portraits and landscapes, who spent what seemed to me a very long time studying a bouquet of flowers reproduced in the heliochromoscope, and left it only to return to it again and again, as if it fascinated him. At last a friend asked him for an expression of opinion upon the merits of the device. After some hesitation, he said that he had attended one of my lectures at the Royal Institution, hoping and expecting to go away and report the failure of another attempt to reproduce the natural colors by photography. He had not been able to do so, but was forced to confess that color photography is a fact. The demonstration was conclusive to him. The heliochromoscope will have no better friends than the artists, for whom it will not only reproduce Nature, but Art as well, in such manner that they can be studied in far-distant lands almost as well as in the galleries where they repose.

In the far West I met the representative of a large New York firm of importers of Oriental rugs. He assured me he was ready to pay a hundred dollars out of his own pocket for a duplicate of the heliochromoscope that I showed him, with a set of photographs of the rugs that he carried about with him only to show their colors. It would save his firm a good deal of money that went in expensive rugs, and in cost of extra baggage, and it would save him a good deal of trouble. A professional house decorator spoke much to the same effect. Evidently, the heliochromoscope will have many fields of usefulness,—so many, perhaps, that its function as a source of drawing-room entertainment, for which alone many have supposed it to be adapted, will prove of secondary importance. But I shall be greatly surprised if, even for the latter purpose, it does not become more popular than the stereoscope ever was, although it is necessarily a much more expensive instrument.

Prof. Farnam on the Genus Amateur.—A most interesting lecture was lately delivered in the mechanics' course at New Haven, Conn., by Prof. Henry W. Farnam, on "The Amateur Photographer." The audience was very large. Many pictures taken by Frederick E. Hotchkiss, Morris F. Tyler and other amateur photographers of New Haven were shown with the stereopticon. Among these pictures was one of Stagg, Yale's famous pitcher, which brought forth much applause, and two of the lecturer himself, in different positions on the same plate. "There is a law of physics," said Professor Farnam, "that two bodies cannot occupy the same space at the same time, but here is one body occupying two spaces at one time."

"Photography properly," he continued, "dates from 1840, although several discoveries in the art were made before this time. Still, everything can be shown to be old, and I propose to show that the photographic art was practiced by Egyptians 4000 years B. C. The great pyramid must have been a photographic laboratory. It contained a dark room, and the dictionary defines a dark room as a place in which photographic plates are developed. Hence, the Egyptians must have been photographers. Cheops, the builder of this pyramid, was probably the first amateur photographer.

"No person who cannot develop his own plates deserves the name of amateur. Such a person bears the same relation to the real photographer, as the organ-grinder does to the skilled musician. The ama-

teur photographer has his enemies, and these enemies are the people he photographs and himself. Recently a foreigner who tried to snap a detective camera on the Sultan was arrested, and would have been strangled if it had not been for the interposition of his country's ambassador. Once I, myself, tried to photograph some Crow Indians. They were splendid specimens for a picture, dressed as they were in buckskins and blankets, and wearing three pairs of earrings. Coming to the conclusion that there was bad medicine in my apparatus, one big buck came up, and, pushing against the tripod, said "No!" probably all the English he could command. As they had been rejoicing over a scalp recently lifted, I thought the sacrifice I might have to make was unnecessary, and so desisted.

"But the amateur photographer is his own worst enemy. As a celebrated Frenchman has said, he often buys an expensive photographic outfit before starting on a journey, but forgets to first learn the art. Or, he may begin with a cheap camera, and then realizing the better work he could do with a superior outfit, he resolves to purchase one, and, unless he have a good sized bank account, he may, in his fascinations, go beyond his means.

"About amateurs of New Haven, many interesting lines could be written. The earliest was Robert Fisher, an assistant in the chemical laboratory of this school, who began in 1858. Among others I may mention Henry Blake and Henry A. Dubois. Another was William Boles, a mechanic, who could make every part of a carriage, and also, the tools he worked with. How many there are at the present time, it would be difficult to tell. Some one has said 100; enough, certainly, to form a society to be one with the sixty-nine others in the United States.

Copying Daguerreotypes and Ambrotypes.—In copying old daguerreotypes or ambrotypes, the operator is frequently baffled by a reflection of the different lights upon the subject, which are in turn reflected upon the plate, ruining the negative. The best way to overcome this difficulty, which is especially annoying with ambrotypes, is to shut off all light in the room but one small window, through which the light falls directly upon the subject. Copies obtained by this method uniformly compare favorably with the originals. Another advantage is that if the originals are sharp and bold the copy may be increased to double the size without losing any of the sharpness and detail of the original. It is almost needless to state that no attempt should be made to copy either in the direct sunlight.

Photographic Hints and Formulæ.

(From Dr. Joseph Maria Eder's "Recepte und Tabellen.")

Toning and fixing bath for aristo and similar emulsion papers:

(*a*) Toning and fixing bath for ordinary purple-brown to violet-black tones.

Water	500 c.c.m.
Hyposulphite of soda	200 grams.
Rhodanammonium (sulphocyanate of ammonium)	25 grams.
Nitrate of lead	10 grams.
Alum	20 grams.

Dissolve the hypo in water, then add the Rhodanammonium, then dissolve the alum, and lastly, the nitrate of lead, dissolved in a small quantity of water, warmed to 122° Fht. Allow the whole to settle, after filtering, add for use, to every 100 ccm. of this concentrated solution ⅞ ccm. of a one per cent. solution of chloride of gold, and 100 c.c.m. of distilled water. The bath is now ready for use, and keeps indefinitely.

Chloro-collodion prints must not be washed before toning and fixing; gelatine papers, on the contrary, must be washed a short time in clear water, and at once removed to the toning and fixing bath.

To dilute the concentrated bath old diluted gold baths, which contain little or no gold, can be used to advantage.

In hot summer weather, or by great heat, the above bath has a tendency to tone too rapidly, and. produce a greenish-yellow tone. This can be obviated by the addition of a few drops of citric acid (5 : 100) or placing the vessel with the toning-fixing bath on ice.

(*b*) Toning-fixing bath for sepia-brown tones.

Water	1000 grams.
Hyposulphite of soda	100 grams.
Acetate of ammonium	100 grams.
1 per cent. solution chloride of gold	30 ccm.

—*Valenta.*

(*c*) Toning and fixing bath for gelatino-chloride papers, giving lighter tones than formula "A."

Water	200 ccm.
Hyposulphite of soda	35 grams.
Chloride of sodium	9 grams.
Chloride of gold	0.1—0.2 grams.
Alum	4 grams.

Prepare eight to ten days before use.—*Dr. Stolze.*

Hot burnishing of Gelatine Papers.—Dissolve in hot water,

Shavings of ordinary castile soap . . . . . 20 grams.
Venetian or glycerine soap . . . . . 10 grams.

then add

Spirits of wine . . . . . 1 lit.

Filter.

Rub the prints over with this solution, using a wad of cotton wool. Run through the burnisher in the usual manner, as soon as the alcohol has evaporated.

Retouching liquid for Albumin prints.

Quillaja saponaria (soap bark) . . . . . 10 to 20 grams.
Boiling water . . . . . 500 ccm.

Pour the water over the crushed bark; filter about two hours, then add

Alcohol . . . . . 200 c.c.m.
Salicylic acid . . . . . 10 grams.

Prints prepared with this solution are ready for retouching or water-color.

Enamel for Paper prints of every sort.

Gum Damar . . . . . 20 grams.
Ether . . . . . 150 c.c m.
Benzene . . . . . 150 c.c.m.

The prints are coated similar to a plate with collodion. This lacquer does not require a previous coating of collodion.

Aquarelle paper:

Water . . . . . 600 parts.
Ammonium-chloride . . . . . 60 parts.
Arrow-root . . . . . 20 parts.
Citric acid . . . . . 3 parts.

Boil, and coat the drawing paper either by coating or floating. To silver, float in the usual manner on a bath 1 : 20. This will give pale copies, suitable for water-color studies. To tone, use a very weak gold bath.

A paper slow-match to ignite blitz-pulver is made by soaking blotting paper in a warm saturated solution of saltpeter, then hang up to dry, and cut into narrow strips. The dry strips keep for months. [It is far safer to use any of the regular apparatus made for the purpose.—Ed.]

Mucilage.—To 250 grams concentrated solution of gum-arabic (two parts gum in five parts water) add a solution of 2 grams sulphate of alumina dissolved in 20 c.c.m. water. This mucilage will not penetrate the paper, and will adhere to wood.

Wood Trays to Withstand Acids.—To impregnate and coat large wood trays so as to withstand the action of acids and alkalies, place in a wide mouth jar

Syrian asphalt	2 parts.
Yellow wax	5 parts.
Rosin	1 part.

Add enough turpentine to dissolve into a thick fluid mass, this will require several days. Before coating, saturate the trays with a thin oil varnish. When dry, close the joints with ordinary putty or mass B, given below. When this is done, give first coat of asphalt varnish diluted with turpentine, that it may better permeate into the wood. When dry, repeat four to six times without thinning the asphalt varnish.

(*b*) Cement for joints and cracks.

Asphalt	200 parts.
Calophonium (rosin)	500 parts.
Tallow	100 parts.

are melted in above order, and run into the joints and cracks while it is in a fluid state.

A Medium to Cement Paper to Metals.—Mix in a mortar five parts wheat flour with one part turpentine; when thoroughly incorporated add, under continuous stirring, a warm watery solution of common glue until the whole forms a paste. This cement dries slowly, but possesses extraordinary adhesive properties, and is especially valuable for labeling tin or other metal vessels.

To Polish Glass Plates.—Clean with a mixture of whiting, alcohol, and ammonia, then rub over with diluted alcoholic tincture of iodine.

Mattolein, a retouching fluid for pencil work on varnished plates, dissolve

Dammara rosin	1 part.
Turpentine	5 parts.

for use rub a few drops over the portion to be worked on.

Photographic Scissors and Paste.

The Ruling Passion.—Young Lady—"Mercy me! And so, when fast in the jungle, you came face to face with a tiger. Ooo! What did you do?" Modern traveler (proudly)—"Photographed it."—*New York Weekly.*

A Photographer in the Tyrol made a negative of ten tourists against a background of pine woods, says a writer in the *Argonaut.* When he developed the plate a faithful presentment of a large bear in the act of making for the denser timber, appeared in the edge of the forest. Neither the man with the camera nor any of those in the group had known that the brute was near.

Prof. Barnard has discovered a comet by the aid of photography. It is only a little one, but he will doubtless get the $200 which is the standing price given him for new comets, just the same as if it were a big one picked up in the old way.

Electric Spark Photography.—Professor Vernon Boys lately brought together in the United Presbyterian Church Synod Hall, Edinburgh, a monster audience to hear his lecture, with experiments, on "Electric Spark Photography," relates the London *Public Opinion.* In the course of the lecture Professor Boys explained that by the electric spark, articles moving at the rate of 10,000 miles an hour can be photographed, and by the introduction of a revolving mirror a speed of 180,000 miles an hour can be coped with. The mirror makes 1024 turns evrey second, worked by electricity, which is equal to about 150 times as fast as a rifle bullet travels. The whole photographic power of the spark is over in a time equal to the ten or eleven millionth part of a second, and it is during that incredibly brief space that the image is made on the sensitive plate.

The New U. S.Coins.—It may be useful to our readers to recall the fact that the U. S. fractional silver currency bears a simple relation to the metric sytem, which relation has been made designedly and by law.

The half dollar is equal to	12½	Gm.
The quarter dollar is equal to	6¼	"
The dime is equal to	2½	"
84 half dollars are equal to	1	kilo.

One Day too Early.—A good story comes from a Birmingham photographer. A lady sat for pictures. The next day she returned for the proof, which was given her in an envelope on which was printed, "Return after five days to——, photographer, Birmingham, Ct." The lady kept the proof much longer than persons usually do, particularly as she said she was in a big hurry for the pictures. On the fourth day she came to the studio, bringing the proof, and apologized to the artist for coming back "one day ahead of time," but she said she had business in town, and could not come again. It took the artist a day to understand what she meant.—*New Haven Palladium.*

She —"Speak out, Mr. Prudence, if you have anything to say." He—"No, thank you. There's a phonograph hidden under the center table, your little brother is under the sofa, the servant is listening at the keyhole, and your mother is looking over the banisters. The only thing that restrains me is my doubt as to the whereabouts of your father."

A Photographic Marvel.—After an exposure of thirty-three minutes, the same instrument which renders visible to the human eye stars of the fourteenth magnitude, which in the entire heavens would register about 44,000,000 stars, shows to the photographic eye 134,000,000, and on an exposure of one hour and twenty minutes, would throw before the astonished gaze of the beholder a luminous dust of 400,000,000 stars. Never before in the history of humanity has man possessed the power of penetrating so profoundly into the depths of the infinite.

It is estimated that from eighty to one hundred thousand dollars worth of nitrate of silver and gold is used every year by the photographers of the United States in making the millions of photographs. If this waste could be saved it would bring down the cost of the pictures immensely.

Amateur Photographers, Beware !—Farmer Wayback—Say, wife, han' me out the shotgun, the big horse pistol and my old huntin' knife.

Mrs. Wayback—What d'ye mean, Phelam, by takin' them to the field with ye?

"Well, I understand that there's a band of premature autographers or some kind of outlaws comin' through the country, takin' farms and everything else they set their eyes on. I calc'late to make it pretty lively for 'em if they try to take my farm in broad daylight."

THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.

A STATED meeting of the Society was held on Wednesday evening, October 12th, 1892, the President, Mr. Joseph H. Burroughs, in the Chair.

Mr. Frederic E. Ives read a paper on the "Heliochromoscope" exhibiting the apparatus and also the special camera in which the negatives, with the necessary triple image taken through a single lens, were made. The wonderful results shown excited the highest admiration and favorable comment from the members present, and at the conclusion of the paper the following resolution was offered by Mr. G. M. Taylor and carried unanimously :—

"Resolved, that the thanks of this Society be extended to our fellow member, Mr. F. E. Ives, for his paper just read, descriptive of further improvements in his wonderful and scientific inventions of camera and Heliocromoscope for reproducing the natural colors in a photographic picture."

Dr. C. L. Mitchell showed a portable divided hand camera, made by Ross & Co., of London. Its principal feature of interest and value consisted in its being provided with a pair of matched lenses, one of which was used as a finder projecting an image on a ground glass the full size of the picture about to be taken with the other lens. This arrangement enabled the picture to be carefully focussed practically at the instant the exposure was made.

Mr. Wm. H. Rau gave a demonstration of the process of making bromide enlargements, using the new apparatus belonging to the Society, in connection with the Welsbach Incandescent Gas Light. In order to overcome the jarring occasioned by heavy machinery in other parts of the building, it was necessary to construct the apparatus with this end specially in view. The stand supporting the apparatus, with the exception of the condensing lenses, rests upon four springs of pure India-rubber. To counteract any motion which might pass through the springs, weights aggregating about 300 pounds rest on the framework of the stand. A second frame is supported on top of the stand on another series of six springs, about 100 pounds of iron weights being placed on this frame. The enlarging camera and board for the paper are rigidly attached to the upper frame. By this contrivance the vibration is entirely overcome, perfectly sharp work being done while the machinery is in active operation.

The Welsbach light used, as described by Mr. Miner, representing the company, consisted of a special burner devised for photographic work, giving a highly actinic light of 175 candle power. By the use

of a parabolic reflector, the effective power of this light was greatly intensified, having been estimated at 600 or 700 candles. The burner was claimed to use but about five feet of gas per hour, making it a very economical light for the purpose as well as a very convenient one, as compared with any form of electric light yet devised.

Mr. Frank S. Lewis mentioned that in developing film negatives, lately, he had noticed that on lifting them out of the tray for examination, at the points where the back of the the film rested on the fingers, the heat of his hand seemed to be communicated through the film so as to accelerate the development at those points. This was particularly noticeable in the skies of the negatives. He had also noticed that with some plates the strong contracting and adhesive power of the gelatine had caused it to pull off part of the outer surface of the glass around the edges of the plate. This seemed to be due to the glue-like character of the gelatine used, and illustrated the process largely used for producing a peculiar rough surfaced glass for decorative purposes.

A member asked why in the case of an interior view, which had an hour and a half exposure, a streak of sun-light which could be assumed to be greatly overexposed, had developed intensely black instead of giving the thin image generally resulting from overexposure.

Dr. Mitchell thought it came from a second reversal of the image at that point, the usual thin image of overexposure being again reversed and showing black.

Mr. C. W. Miller said that if an overexposed negative were developed long enough it would become black all through, as with the streak of sunlight. But, usually with such negatives, they were soon found to be overexposed and the developer modified accordingly, the development being stopped before intense blackness was reached.

A member stated that in photographing in Florida, the Yellowstone Park, and other places where the sky was intensely bright, the skies were almost always overtimed and thin, and asked for a remedy.

Mr. Carbutt recommended washing the plate off when the sky had reached the proper intensity in developing, and then with a tuft of cotton or soft brush continuing to apply the developer to the foreground until a harmonious result was obtained.

Mr. Ives practiced another method, which was to reduce the overdeveloped portion of the negative with Farmer's Solution applied in a similar manner to that recommended by Mr. Carbutt. This he did after fixing, and in daylight, which was quite an advantage.

Adjourned. ROBERT S. REDFIELD, *Secretary.*

In the Twilight Hour.

EXAMPLE is the most powerful rhetoric.

GOD makes afflictions to be but inlets to the soul's more sweet and full enjoyment of His blessed self.

A MAN may as truly say, the sea burns, or the fire cools, as that free grace and mercy should make a soul truly gracious do wickedly.

PROMISES must be prayed over in private; God loves to be sued upon his own bond, when he and his people are alone.

SIN may *rebel*, but it shall never reign in any saint.

FOR a man to have a great name to live, and yet to have but a little life, is a stroke of strokes. To be high in name, and little in worth, is a very sad and sore judgment.

CHRISTIAN, if you would keep humble, if you would lie low, draw forth your artillery, place your greatest strength against the pride of your soul. The death of pride will be the resurrection of humility.

OF all mercies, pardoning mercy is the most sweetening mercy. It is mercy that makes all other mercies look like mercies, and taste like mercies, and work like mercies. He who has it cannot be miserable; he who wants it cannot be happy.

AS the peacock, looking upon his black feet, lets fall his plumes, so the poor soul, when he looks upon his black feet, the vanity of his mind, the body of sin that is in him, his proud spirit falls low.

AN HUMBLE soul knows, that to bless God in prosperity, is the way to increase it; and to bless God in adversity is the way to remove it.

IT was a saying of Austin, "He that willingly takes from my good name, unwillingly adds to my reward."

MERCY is "Alpha," justice is "Omega."

RICHES, though well got, are yet but like to manna; those that gathered less had no want, and those that gathered more found it but a trouble and annoyance to them.

HE who turns not from every sin, turns not aright from any one sin.

SOME degree of comfort follows every good action; as heat accompanies fire, or beams and influences issue from the sun.

THE most holy men are always the most humble men; none so humble on earth as those that live highest in heaven.

THOUGHTS are the first-born, the blossoms of the soul, the beginning of our strength, whether for good or evil, and they are the greatest evidences for or against a man that can be.

SUCH as have made a considerable improvement of their gifts and graces, have hearts as large as their heads; whereas most men's heads have outgrown their hearts.

NO saint so like a sinner as a weak saint.

EARTHLY riches are called thorns, and well they may be; for as thorns they pierce both head and heart; the head with cares in getting them, and the heart with grief in parting with them.

A LITTLE leaven leaveneth the whole lump; a little stuff may kill one; a little leak in a ship sinks it; a little flaw in a good cause mars it; so a little sin may at once bar the door of heaven, and open the gates of hell.

One of the ancients used to say that humility is the first, second and third grace of a Christian.—*Excerpt from Thomas Brooks, Obit. A.D. 1680.*

Literary and Business Notes.

LANSFORD, PA., Sept. 22, 1892.
Messrs. Thos. H. McCollin & Co.,
1030 Arch St., Phila.;

GENTLEMEN: The developer which I recently received from you is *the best* that I have ever used in my many years of business.

I have used it on several plates, and it is *elegant;* receiving the best possible results.

So long as you furnish me with this developer, I shall use no other in my studio; I shall also recommend it to my friends.

Respectfully yours,
RUDOLPH E. NAGEL, *Artist.*

MIS BUENOS TIEMPOS. Memorias de Estudiante. Par Raimunda Cabrera. Second edition, printed and illustrated by the Levytype Company, Philadelphia.

An interesting work in the Spanish language, by Raimund Cabrera, the well-known Cuban novelist. The work does credit to the contracting company, who furnished the edition complete for the author.

"SOLIO" PAPER.—We have received a number of prints from the Eastman Company on the new "Solio" paper. They certainly show a delicacy of tone and clearness in the shadows, equal, if not superior, to any paper in the market. The new paper is well worthy of the attention of every professional photographer.

CRAYON PORTRAITURE, LIQUID WATER COLORS, FRENCH CRYSTALS. By J. A. Barhydt. The Baker and Taylor Co., 740 Broadway, N. Y.

This comprehensive work upon the subjects indicated in the title is the second treatise by the same author. The book is an invaluable guide for the professional as well as amateur who soars behind the hum-drum routine of everyday work. The book embodies the results of over twenty-four years practical experience in studio work, and will prove an invaluable text-book to all students in photographic portraiture.

RECEPTE UND TABELLEN FUR PHOTOGRAPHIE UND REPRODUCTIONSTECHNIC. Von Dr. Josef Maria Eder. Third edition. Wilhelm Knapp, Halle a. S., 1892.

A handy compendium of recipes, formulas, and tables collected from the previous publications of the author, supplemented by a number of new ones. It is without doubt the most valuable handbook for the photographer published in any language.

PHOTOGRAPHIC PATENTS.

The following list of patents relating to the Photographic interests, is specially reported by Franklin H. Hough, Solicitor of American and Foreign Patents, No. 925 F. Street, N. W., Washington, D. C., who will furnish copies of patents for 25 cents each.

ISSUE OF AUGUST 30TH, 1892.

481,802.—Camera Plate-Attachment. George L. Minear, Ottumwa, Iowa.

ISSUE OF SEPTEMBER 6TH, 1892.

482,002.—Photographic Background-Holder. Alvin C. Caswell, Fitchburg, Mass., assignor to Nashua Iron and Brass Foundry Company, Nashua, N. H.

ISSUE OF SEPTEMBER 13, 1892.

There were no Photographic Patents contained in this issue.

ISSUE OF SEPTEMBER 20TH, 1892.

482,854.—Photographic-Shutter. John E. Thornton, assignor of one-half to E. Pickard, Manchester, England.

482,978.—Photographs, pictures, and analogous articles, support for. Andrew Hunter, Chicago, Illinois.

ISSUE OF SEPTEMBER 27TH, 1892.

483,135.—Photographic Lenses, Diaphragm for. Edgar R. Bullard, Wheeling, West Virginia.

483,280.—Picture Stretcher, Folding. Edward R. Butler, Ueberlinger, Germany.

ISSUE OE OCTOBER 4TH, 1892.

483,688.—Photographic Cameia. Frederick A. Hetherington, Indianapolis, Ind.

483,606.—Photographic Purposes, device for modifying and controlling rays of light for Amasa P. Flaglor, assignor to H. Flaglor, San Francisco, Cal.

ISSUE OF OCTOBER 11TH, 1892.

484,179.—Cameras. Finder sttachment for William B. Cogswell, Syracuse, N. Y.

484,165.—Photographer's Background-Holder. William I. Scandlin, Brooklyn, New York.

484,175.—Photographic Printing Frame. Frederick O. Bynoe, London, England.

ISSUE OF OCTOBER 18TH, 1892.

484,456.—Camera-Shutter. Henry C. Platt, Nantucket, Mass.

484,699.—Photographic Dark-Chamber. Isaac Bryner, Callaway, Nebr.

484,569.—Photographic-Plate Holder. Arthur M. Pierce, Brooklyn, assignor to Eastman Kodak Company, Rochester, N. Y.

ISSUE OF OCTOBER 25TH, 1892.

There were no photographic patents included in this issue.

THE METRIC SYSTEM.*

FRENCH FLUID MEASURES.

THE cubic centimetre, usually represented by "c.c.," is the unit of the French measurement for liquids. It contains nearly seventeen minims of water; in reality, it contains 16.896 minims. The weight of this quantity of water is one gramme. Hence it will be seen that the cubic centimetre and the gramme bear to each other the same relation as our drachm for solids and the drachm for fluids. The following table will prove to be sufficiently accurate for photographic purposes:

1 cubic centimetre	=	17 minims (as near as possible).					
2 cubic centimetres	=	34	"				
3 "	=	51	"				
4 "	=	68	"	or 1 drachm	8 minims.		
5 "	=	85	"	" 1 "	25 "		
6 "	=	102	"	" 1 "	42 "		
7 "	=	119	"	" 1 "	59 "		
8 "	=	136	"	" 2 drachms	16 "		
9 "	=	153	"	" 2 "	33 "		
10 "	=	170	"	" 2 "	50 "		
20 "	=	340	"	" 5 "	40 "		
30 "	=	510	"	" 1 ounce	0 drachm	30 minims.	
40 "	=	680	"	" 1 "	3 drachms	20 "	
50 "	=	850	"	" 1 "	6 "	10 "	
60 "	=	1020	"	" 2 ounces	1 "	0 "	
70 "	=	1190	"	" 2 "	3 "	50 "	
80 "	=	1360	"	" 2 "	6 "	40 "	
90 "	=	1530	"	" 3 "	1 "	30 "	
100 "	=	1700	"	" 3 "	4 "	20 "	

THE CONVERSION OF FRENCH INTO ENGLISH WEIGHT.

Although a gramme is equal to 15.4346 grains, in the following table it is assumed to be 15 2-5 grains, which is the nearest approach that can be made to *practical* accuracy:

1 gramme	=	15 2-5 grains.				
2 grammes	=	30 4-5 "				
3 "	=	46 1-5 "				
4 "	=	61 3-5 "	. . . . . or	1 drachm	1 3-5 grains.	
5 "	=	77 "	. . . . . "	1 "	17 "	
6 "	=	92 2-5 "	. . . . . "	1 "	32 2-5 "	
7 "	=	107 4-5 "	. . . . . "	1 "	47 4-5 "	
8 "	=	123 1-5 "	. . . . . "	2 drachms	3 1-5 "	
9 "	=	138 3-5 "	. . . . . "	2 "	18 3-5 "	
10 "	=	154 "	. . . . . "	2 "	34 "	
11 "	=	169 2-5 "	. . . . . "	2 "	49 2-5 "	
12 "	=	184 4-5 "	. . . . . "	3 "	4 4-5 "	
13 "	=	200 1-5 "	. . . . . "	3 "	20 1-5 "	
14 "	=	215 3-5 "	. . . . . "	3 "	35 3-5 "	
15 "	=	231 "	. . . . . "	3 "	51 "	
16 "	=	246 2-5 "	. . . . . "	4 "	6 2-5 "	
17 "	=	261 4-5 "	. . . . . "	4 "	21 4-5 "	
18 "	=	277 1-5 "	. . . . . "	4 "	37 1-5 "	
19 "	=	292 3-5 "	. . . . . "	4 "	52 3-5 "	
20 "	=	308 "	. . . . . "	5 "	8 "	
30 "	=	462 "	. . . . . "	7 "	42 "	
40 "	=	616 "	. . . . . "	10 "	16 "	
50 "	=	770 "	. . . . . "	12 "	50 "	
60 "	=	924 "	. . . . . "	15 "	24 "	
70 "	=	1,078 "	. . . . . "	17 "	58 "	
80 "	=	1,232 "	. . . . . "	20 "	32 "	
90 "	=	1,386 "	. . . . . "	23 "	6 "	
100 "	=	1,540 "	. . . . . "	25 "	40 "	

* Published by request.

"INNOCENCE."

AUTOGLYPHIC HALF-TONE ENGRAVING,
BY THE LEVYTYPE COMPANY, PHILADELPHIA.

FROM NEGATIVE BY
BACHRACH BROS., BALTIMORE.

AMERICAN JOURNAL
OF
PHOTOGRAPHY

THOS. H. McCOLLIN, Managing Editor.
JULIUS F. SACHSE, Editor. XANTHUS SMITH, Associate Editor.

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COMMERCIAL MOUNTANTS.

BY ELLERSLIE WALLACE.

THE word mountant has long been adopted as a convenient expression to denote the mixture made use of to confine paper prints in their proper position on the cardboard. It is thus one of our technical terms in photography, but persons sometimes go wrong in the use of even these simple expressions, and we remember once seeing this term mountant translated into a German photographic contemporary by language meaning a man who goes up mountains!

The chemical relation between mountants and the fading of mounted prints is a matter which still commands the attention of practical photographers, and it is to be regretted that no specific directions how to make silver prints permanent can be given. It is impossible for us to say, Make your prints on this or that paper silvered thus, toned thus, and fixed and mounted thus, and then they will never fade. All that we can do is to take the ripened experience of many years and say, Avoid certain things in making your prints, for it is known that they cause fading in a comparatively short time.

Commercial mountants may be divided into three classes, the gelatinous, the starchy, and the mixture of the two together. Now nothing is more convenient than to have a bottle of mountant always in readiness, so that prints may be mounted at short notice; but is this proceeding a safe one as regards the permanency of the print? While we believe that an affirmative answer

might be given in the case of platinum and perhaps bromide prints, we certainly condemn the using of any other mountant than a fresh-made one for prints made on silvered paper; moreover, we assert this most strongly against gelatine mountants of all kinds, but particularly those to which glycerine has been added.

Some of the less conscientious persons in the photographic calling do not scruple to mount silver prints with the commonest kind of glue. We merely allude to this matter in order to express our strongest disapprobation. Almost everybody knows that the difference between refined gelatine and common glue is one of degree rather than of kind; but even the finest commercial gelatine is not now deemed safe. Gelatine is a substance possessing a strong affinity for water, and this is greatly increased by the addition of glycerine. The glycerine is very desirable, almost indispensable indeed in a pure gelatine mountant, because it renders the mixture less horny, and more workable. Now it is open to doubt whether prints mounted with such a compound ever really dry. We have known prints so mounted, and kept in a perfectly dry place, to leave their mounts at the slightest touch, while others framed and hung on a wall began to fade almost immediately.

These remarks will be understood as applying to the ordinary silver print on either albumenized or plain paper. As we said a moment ago, platinum or bromide prints could fairly be expected to last better, because neither of them contain that delicate albumeno-silver compound upon which the beauty and the instability of the silver print both depend. It is also well known in photography that all developed images are more permanent and lasting than those which are "printed out." On this ground alone, better results in permanency are to be expected from bromide and platinum.

There is a class of commercial mountants partly or wholly starchy in character. All the forms of parlor pastes rank in this category. It seems strange that while plain boiled starch fresh-made is the best and safest mountant, flour-paste should have always been in bad odor amongst photographers. Yet practice

and experience—the safest guides to follow—prove this to have plenty of foundation. Pastes made of ordinary wheat-flour are very prone to mould; and while this tendence can be counteracted in great measure by certain additions, they themselves have an injurious effect either upon the silver compounds in the print or upon the whiteness of the paper. Dextrine also belongs to this class, being a derivative of starch. Gum arabic is out of the question; being at once too much inclined to turn sour, and very expensive if good qualities are selected. India-rubber was at one time quite in vogue, and if it played the same trick as gelatine with glycerine, in letting the print scale off after a time, it was at least harmless as regarded any injurious effect upon the stability of the print.

Silver prints of large dimensions are sometimes sized with a gelatine sizing and varnished. The practice cannot be called a safe one however. Recent experiences point strongly to the danger of using gelatine in any form with a silver print. This applies also, we regret to say, to the cementing of prints to glass. It is probable that Canada balsam could be made to serve for this purpose. If gelatine must be used, however, we advise the best quality only, carefully tested for acidity, and used if possible without glycerine. If the prints peel off the glass, the glycerine will have to be added. Cemented prints ought always to be hermetically sealed in their frames, or at least as nearly so as possible, and hung in a place perfectly free from dampness.

On talking these matters over with one of our oldest and best photographers, he went so far as to condemn commercial mountants altogether, calling them "a lazy man's resort." While this may be an extreme view to take of the matter, so far as amateurs are concerned, we are nevertheless sure that it is the correct and safe one for the professional photographer. Starch paste, the best and safest mountant, is made in a few moments with little or no trouble and expense. It should be made fresh every day and never kept over; and the brushes and vessels well washed the last thing at night, to be dry and ready by morning.

DRY MOUNTING.

BY F. STOLZE.

Translated from the German for the AMERICAN JOURNAL OF PHOTOGRAPHY.

IT is an old complaint that photographic prints will cockle after mounting, and that only the heaviest mounts offer a remedy. This is but natural, as the prints expand when moistened with the paste, or when soaked previous to mounting. As the mounted print dries it contracts, and the cockling commences.

Many are the various remedies which have been suggested. The best of all these suggestions is without a doubt the process known as "dry mounting," in which the print is first coated with the mountant, dried, and then attached under great pressure to the mount which has been slightly dampened.

To produce a sufficient pressure the ordinary screw press is not sufficient; excellent results, however, are to be obtained by placing the mount and picture face down on a polished stone, and then passing the whole through a lithographic press. A similar result can be attained by aid of a photographic roller press if a polished steel plate is substituted for the stone.

As the professional photographer never possesses a lithographic press, and only in occasional instances a rolling press, the latter is mostly used for the purpose of dry mounting. There are, however, several great disadvantages connected with its use, as it is far from advisable to bring dampness in contact with a polished steel plate, as it easily rusts, and becomes useless for photographic purposes; further, it is difficult to place the print and mount face down on the steel plate without getting the print out of position. Another trouble is that almost all photographers, professional and advanced amateurs, use an ordinary burnisher, and have no rolling press. Such being the case the question now arises what is best to be done? There is in fact a simple apparatus to be found in almost all domestic households, which answers the purpose thoroughly without any of the disadvantages attendant on the use of a roller press. The apparatus is nothing more nor less than an ordinary wringing machine.

The method of use is an easy one, viz.: Brush the print over with paste or mountant while yet damp and untrimmed; when dry, press under a copying press, and trim to requisite size. Then dampen the face of the mount with a wet sponge, place the print upon it, and lay over it a piece of thin zinc, and pass the whole through a tight wringer. If the print is on aristo or gelatine paper the zinc plate must be first rubbed over with talc. This method of mounting is absolutely safe, very easy of manipulation and handy; the prints dry quickly, and adhere well. No paste can squeeze out from under the edges, and a soiled mount is an impossibility.—*Photographische Nachrichten.*

[Even better results may be obtained by substituting a ferrotype plate for the zinc plate.—ED.]

AMIDOL.

A NEW developer has lately been brought to the notice of the photographic public, under the name of Amidol. This new substance, which emanates from the laboratory of M. J. Hauff in Feuerbach, Germany, differs from all similar substances as it acts as a developer without the addition of any alkali; mixed with neutral sulphite of soda it produces a very energetic developer. Judging by the sample received from the inventor, it certainly seems like a valuable acquisition to the already numerous photographic reducing agents, and may prove of especial value to tourists and amateurs.

In making our experiments we followed the formulæ published by the manufacturers, viz.:—

Amidol - - - - - -	8 parts.
Sulphite of soda - - - -	80 parts.
Water - - - - -	800 parts.

As a retarder a few drops of bromide solution 1 : 10 proves of advantage, while a concentrated solution of neutral sulphite of soda acts as an accelerator.

The stock solution diluted by three to four times its volume of water made a rapid and safe developer, the image coming up

rapidly and gaining in density without danger of fog. After repeated use, however, the action was somewhat similar to Rodinal as it becomes yellow and rapidly loses its efficacy.

Several modifications of above formula have already been published in Europe and England, and it is more than probable that as the Amidol gets into general use, still different combinations and modifications will be worked out. From appearances thus far, Amidol is likely to prove the most dangerous rival which pyrogallic acid has thus far encountered.

The American agents of the Hauff Laboratory state that they cannot definitely answer whether the salt is poisonous or not but will submit the question to the manufacturer. Personally they do not think that amidol is any more poisonous than Eikonogen, Rodinal, or Hydrochinone.

As to a permanent supply of uniform strength and quality they state that they have not the least doubt but that the same will be so supplied.

In the English patent specifications the following information is given:

THE USE OF AROMATIC AMIDO COMPOUNDS AND OF DERIVATIVES OF PHENOL FOR THE DEVELOPMENT OF PHOTOGRAPHIC IMAGES.

JULIUS HAUFF, Feuerbach near Stuttgart, Germany.—*September* 17, 1892.

THIS invention has for its object the use for developing latent photographic images or views of substituted amido-phenols which have the property of dissolving readily in carbonates of the alkalies. These compounds belong to the "glycine" class, and are produced by replacing an atom of hydrogen in the group NH_2 of the amido-phenol by an acetic acid residuum. The typical formula for these compounds is:—

$$C_nH_{2n-8}\ OH.\ NR.\ CH_2COOH.$$

These compounds are the glycines of the following amido-phenols:—

1. p-amido-phenol,
2. o-amido-m-cresol,
3. m-amido-o-cresol,

4. m-amido-(v-) m-xylenol,
5. m-amido-p-xylenol,
6. o-amido-(v-) o-xylenol,
7. o-amido-(s) m-xylenol.

These compounds are used in solution with sulphites and carbonates of the alkalies for the purpose of developing latent photographic images or views.

For instance, I dissolve in one hundred c.c. of water, four and a half grammes of crystallized sulphite of soda, one and a half grammes of glycine, and two and a half grammes of potash, this compound forming a developing means particularly suitable for the development of landscapes. For portrait work and the like, the solution may be concentrated or further diluted, according to the temporary conditions as to light, plates, etc.

Having now particularly described and ascertained the nature of this invention, and in what manner the same is to be performed, I declare that what I claim is:—The use of the glycines of the following amido-phenols for the development of the photographic views or images in layers containing halogen silver:

1. p-amido-phenol,
2. o-amido-m-cresol,
3. m-amido-o-cresol,
4. m-amido-(v-) m-xylenol,
5. m-amido-p-xylenol,
6. o-amido-(v) o-xylenol,
7. o-amido-(s-) m-xylenol.

Rifle Bullets are now photographed in their course by means of the electric spark. The camera is taken into a dark room, which the bullet is caused to traverse. As it passes the camera it is made to interrupt an electric circuit and produce a spark, which illuminates it for a instant and enables the impression to be taken. The wave of condensation in the air before the bullet and the rarefaction behind it are visible in the photograph, and can be studied by experts, thus enabling the form of ball or rifle which minimizes the resistance of the air to be selected.

A SUCCESSFUL PICTURE.

BY XANTHUS SMITH.

A VERY useful practice in looking at works of art, is to analyze them as to their constitution, by way of determining their merit or demerit, their success as to attainment or failure of aim.

We are shown a picture, for instance, which appeals at once to us, and averting our attention, conveys to us some sentiment so completely in union with our ideas that we are extremely gratified by it.

Let us ask ourselves, always, what it is in a successful picture that gives to it its attractiveness. Of course the character of mind of the individual impressed must be taken into account, and of those to whom the representation of the boxer, the prize pug or the favorite trotter appeal, we will have nothing to say at present, but we will confine our remarks to persons possessed of sufficient sentiment to appreciate the beauties of subjects worthier of portrayal.

Subjects embodying representations of scenes in human life, will always be found the most attractive to the largest number of persons, and when the scenes or incidents represented portray occurrences connected with the higher sentiments and passions, they will be the more acceptable and interesting to right-minded people, and will take a higher place as educators in the great field of art education. Nor is it necessary that these incidents be derived from the high-flown tales of mythology, or be a pictorial embodiment of our Christian faith, such art being out of the pale of the aspirant with the camera. Indeed, mythological and sacred art can be touched but by the very few. The ability to be great in these walks may truly be accounted a divine gift, in proof of which we have only to sight the career of our great Benjamin West, who, born of unartistic parents, belonging to a sect that disapproved of art, and in the utmost seclusion from all art influences, had planted within him the divine gift which enabled him to become one of the greatest of historical painters;

his brother artists, distinguished connoisseurs and princes all agreeing in according him the exalted position which his merits entitled him to hold.

While photographers cannot aspire to these higher subjects on account of their imaginative and creative character, they may yet study such work, and derive pleasure and benefit from it, and apply many of its principles to the more humble, yet often no less attractive and touching, walks of genre or everyday art.

The field in domestic art is large for the photographer, the scenes and incidents constantly taking place about us afford a great many opportunities for producing very interesting pictures, especially as they may so often be made to embody women and children, around whom are entwined all the higher and more refined sentiments that grace the domestic circle.

In the portrayal of domestic scenes the utmost amount of taste and skill may be shown in the selection of incidents, the grouping and the artistic effects of lighting.

The selection of models in every way adapted to the incident to be depicted, is a matter of prime importance, the refined and classical for the more elevated subjects, and the ragged and character-marked for the picturesque. There should always, however, even in the picturesque, be sufficient grace or sentiment to lift the work out of the commonplace or vulgar. The separation of the purely picturesque from what is absolutely commonplace is a nice point, difficult ground to travel upon. There should be a certain dignity in picturesque old people, and a certain grace and beauty, what is called rustic beauty, in picturesque children to lift them out of the vulgar.

In genre subjects, embodying the picturesque solely, they will be much elevated by a due care to the grace of composition and harmony of effect of light and dark, though this should not be relied upon entirely. Flemish art, though it is admired for its artistic perfections, is yet justly open to severe criticism for the want of more elevation in its portrayal of commonplace life. Some of the finest productions of the Flemish masters as pictures are yet so low in sentiment, so steeped in commonplace vulgarity, as to be absolutely repulsive.

Let the photographer keep in mind in his work a standard of purity and grace and beauty that will elevate all that he does. Let him select for his old people those possessed of large, well-formed features, and having a look of mind, and for his children the plump and symmetrical; and let him by all means avoid the extreme peculiarities of fashion in attire, especially when such fashion is at variance with the graceful or the picturesque.

In making groupings the background plays an exceedingly important part. The simple varied background, light at one corner and dark at the opposite, against which the portrait photographer daily poses a head, gives the cue to an important art secret. Groups arranged against flat, equally lighted backgrounds, be they either light or dark, can never produce fine or interesting pictures, as the whole will be equally cut out, and hardness and dryness and consequent want of interest will be the inevitable result. The secret is probably the pleasurable sensation given by the variety which contrast begets, but certain it is, that the interweaving of lights and darks, the interchanging of light against dark and dark against light, gives us our most captivating effects.

Avoid large patches of strong light or strong dark in garments. If such surfaces be admitted into a picture, and if they happen to be of angular and ill-shapen form, they will utterly destroy any artistic pretensions in the picture. Seek to attain in the attires broken hues and quiet broken patterns, with a small amount of concentrating depth and high light in well-formed spots.

To come back to the subject of the background, which is an exceedingly important one, it may be taken as a rule that the more important your subject the quieter should be the background. All that may be introduced in it to give interest and break up its baldness and assist in telling the story, should be kept in absolute subordination to the principal aim of the work.

In looking over what may be considered very successful pictures, which we are sorry to say are only too rare amongst the large amount which falls under our observation, it will be found that the secret of success is in the perfect fitness of the models to

the aim of the story to be told. Their freedom from stiffness, nature caught in her graceful mood, the absolute subordination of the background to the subject, the subject or groups being in parts lost in the background, the most violent relief being in the principal points to be brought forth, and the accentuation of focus on the principal features of the subject. All this attained, with a good telling incident, must, we feel confident, invariably secure success for a photograph.

SELF-TAUGHT MEN IN LITERATURE.

DANIEL DEFOE, the author of "Robinson Crusoe," one of the greatest writers of prose fiction that ever lived, began life as a hosier, and was almost wholly self-taught. William Cobbett, the great writer of racy Saxon English, was in early life a farmer's boy, and afterwards a common soldier. Izaak Walton, the pleasing biographer and "complete angler," was a linen-draper.

Then in science. Thomas Simpson, the distinguished mathematician, wrought for the greater part of his life as a weaver. Captain Cook, one of the most scientific of English sailors, and a very pleasing writer, was wholly self-taught. His father, a poor peasant, learned to read when he was turned of seventy, in order that he might be able to peruse his son's voyages. Arkwright, subsequently Sir Richard, the inventor of the cotton-spinning machine, was a poor man, and commenced life as a barber. James Brindley, the author of canal navigation in England, the first who tunneled great hills and brought ships across navigable rivers on bridges, was a millwright. Herschell, subsequently Sir William, originally a musician in a Hanoverian regiment, became a skillful optician and a great astronomer. To him Campbell refers in the well-known line:

> "Gave to the lyre of heaven another string."

Then for the fine arts. Chantrey was a milk-and-butter boy, and his first mouldings were in softer materials than marble. Sir Thomas Laurence was the son of an inn-keeper, and wholly

self-taught. John Opie was found by Dr. Walcott working in a saw-pit. William Hogarth, the greatest master of character that ever developed his ideas by means of the pencil, served his apprenticeship to an engraving silversmith, and commenced his professional career by engraving coats-of-arms and shop bills.

Then in poetry. Gifford, the first editor of the *Quarterly*, began life as a poor sailor-boy, and afterwards served an apprenticeship to a shoemaker. Bloomfield wrote his best poem, the "Farmer's Boy," while he too worked in a garret as a shoemaker. "Ben Jonson," says Fuller, in his "English Worthies," worked for some time as a bricklayer and mason. He helped to build the new structure of Lincoln's Inn, when, having a trowel in his hand, he had a book in his pocket. Shakespeare was a poor man's son; his father could not write his name, and his cross and mark still exist in the record of Stratford-on-Avon to attest the fact. The poet's own education seems to have been very limited, and tradition describes him as having lived for a time by very humble employments. Then turning to theology, the highest range of all, we find the two Millers, Doctor Isaac, dean of Carlisle, and his brother Joseph, author of the well-known "History of the Church," began life as weavers. Dr. Prideaux, author of the "Connection" and Bishop of Worcester, got his education by entering Oxford as a kitchen-boy. John Bunyan, the greatest master of allegory, and author of the second-best book in all the world, was a self-taught tinker. These be some of England's hosiers, and linen drapers, and millwrights, and masons, and sailors, and shoemakers, and weavers, and barbers, and tinkers, who have thought and written to some purpose,—an honor to themselves and to the prosaic calling in which the earlier part of their life was spent, before their superior brain-power asserted itself for the good of future generations.

Looking Pleasant, Please.—"By thunder, old fellow, what has happened to you that you smile so all the time? What is it so good?"

"Oh, nothing at all, but you see one never knows nowadays but somebody may be photographing him."—*Fliegende Blaetter.*

EARLY DAGUERREOTYPE DAYS.—VI.

AN HISTORICAL RETROSPECT.

BY JULIUS F. SACHSE.

(*Continued from page 459.*)

IN a previous paper mention was made of the crude apparatus improvised by the early American experimenters in the Daguerrean process. The evolution of the photographic camera through its various stages from the first box camera of the French experimenters to the present complex and perfected outfits, with their facilities for adjustment in height, angle of presentation, and for focus, and arrangements for introducing and withdrawing slides, is in itself an interesting study, and forms an important contribution to the history of the development of photography.

The camera used by Daguerre was an exceedingly simple piece of mechanism. It consisted simply of a wooden box (A, Fig. 1), painted black on the inside. At one end was the

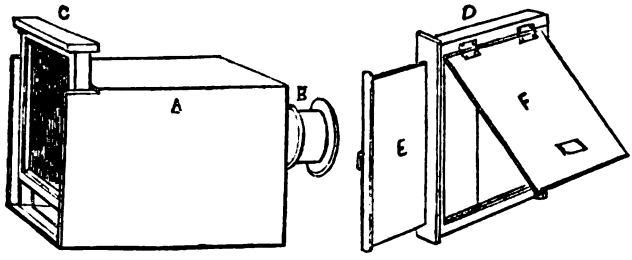


FIG. 1.

arrangement of the lens (B), and in the opposite end a groove was cut in which slid a frame holding the ground glass (C). The latter was intended to be in focus with the lens. (D) represents the frame for holding the silver plate, and is shown open; (E) the dark slide, being down. The plate was placed in the frame, and the flap (F) closed, this of course being done in the dark. As tripods and an adjustable focus were not then known, the camera, when used for an exposure, was placed on a table and moved

back or forth until the correct distance to suit the fixed focus was found, when it was ready for the exposure. Great care had to be taken not to move or jar the camera, as otherwise the image would be blurred.

This simple apparatus was soon improved by the French mechanics, so that one-half of the body slid into the other half, or telescoped. The lens was also set in a separate tube, with a rack and pinion arrangement; this allowed a much greater range. Lenses differing in focal length could also be utilized when necessary. This type of camera is still known as a "box camera."

An English improvement soon followed,—making all sides equal, which allowed the holder to be inserted so that horizontal or vertical views could be taken. Heretofore the French cameras had to be turned on their side to change the position of the plate.

As soon as Daguerrean portraiture became an established fact, and the German opticians commenced to assert themselves, a novel apparatus was invented in Germany designed exclusively for portraiture. This was made entirely of brass, so that variation of climate had no effect upon it; it was portable, and occupied but little space. It became known as the "German" or "Voigtlander" Camera (Fig. 2). The brass foot (A) is placed upon a table or other firm support, and the pillar (B) screwed into it. The body of the camera (CC) is laid in the double forked bearing (DD). The instrument is now properly adjusted by means of the set screws (*eee*) in the brass foot, or it may be raised, lowered, or moved from one side to the other by the telescope stand, and

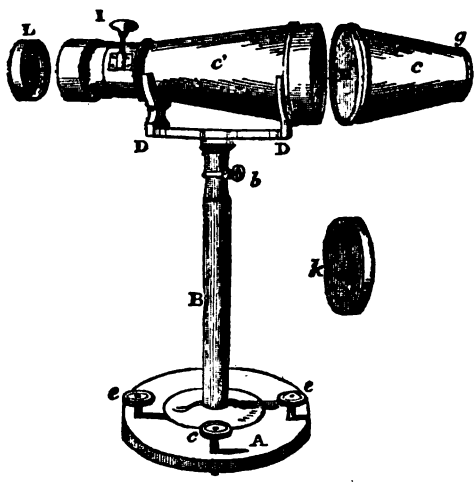


FIG. 2.

when correct fixed by the screw (*b*). The portrait to be delineated is viewed either through the small lens (*g*), or with the naked eye on the ground glass plate (H), the focus being adjusted by the screw (I). The optical part of the instrument consisted of a small set of achromatic lenses.

When the portrait to be taken was delineated on the ground glass to the satisfaction of the operator, the brass cap (L) was placed over the lens, and the entire body taken into the dark room, taking care not to disturb the position of the stand. The body was then detached at the part (H), and the prepared plate, inclosed in the brass frame (K), introduced into its place. The whole was then again placed in position on the pedestal before the sitter; the brass cap (L) was then removed, by which the plate was exposed to the full influence of the light, after which the cap was again replaced.

To return to our own country:—

Our American experimenters had nothing to guide them in the construction of apparatus except the meagre descriptions of Daguerre's crude box, consequently almost all were thrown upon their own resources and ingenuity. It has already been told how Joseph Saxton and others improvised the necessary implements from such material as they had at hand, also how the former came to Robert Cornelius with request to make for his use a camera, fuming-box, and mercury bath of tin. These attempts to secure practical working apparatus soon led to the construction of an apparatus for Goddard and Cornelius, which for ingenuity, excellence of workmanship and utility, are not excelled even to the present day. Another instance where American ingenuity asserted itself; the mechanic who constructed Cornelius and Goddard's first studio outfit was Joachim Bishop,[1] a young man

[1] Joachim Bishop came to Philadelphia in 1811, when five years of age. In 1826 he served an apprenticeship with a jeweler, and afterwards as a brass-worker; from 1832 to 1839 he was employed by Dr. Robert Hare, Professor of Chemistry, as an instrument-maker and assistant.

In the year 1839 he left there, and commenced business as a philosophical-instrument-maker in Philadelphia, and thus became the first maker of photographic apparatus in America. In 1845 Bishop commenced to work platinum, and drew the first premium at the Franklin Institute exhibition for that year. For many years he was the only refiner and melter of platinum in America, and at the Centennial Exhibition in 1876 he was the only exhibitor of platinum work in this country.

who was then an assistant to Dr. Robert Hare, Professor of Chemistry at the University of Pennsylvania. Bishop was a natural-born genius, and for many years the best maker of philosophical instruments in America, and in later years will be remembered as the only man in America who could smelt and refine metallic platinum.

This American camera was of the sliding-box order, made of white pine wood, and blackened within and without; and was intended to be portable, as when extended its full length all the other pieces of apparatus were made to fit inside (see illustration). The camera proper, or that part fastened upon the base board, was 10 inches high by 12 inches wide; outside measurement. The depth was 7½ inches.

The rear or sliding part, lined throughout with black velvet, measured inside 8½ by 10 inches and 7¾ inches deep. This made the interior, when extended, measure 14 inches from front board to ground-glass. The telescoping was controlled and fixed by a tightening screw, which worked in a groove in the base-board, similar to many still in use. The lens, called in that early day a periscopic—achromatic—is 2 inches in diameter, set in the back of a sliding tube two inches long, the front of which was protected by a brass cap having an orifice nine-sixteenths of an inch in diameter. This was controlled by a brass shutter.

The focusing arrangement was movable, similar to those on our most improved cameras; the opening for the ground-glass is 4½ by 6 inches, the glass being merely fastened in with gummed paper. Upon the outside of this back there was attached a flap upon the inside of which was a mirror 4½ by 6 inches; also a hook and staple which set the mirror at an angle of 45 degrees. This novel arrangement was used for focusing the image, which was reflected from the ground-glass upon the mirror.

After the proper focus was obtained the back was removed, and a plate-holder substituted. This was also of novel and crude construction; the back which held the plate was loose and made

Bishop was a self-taught man: all of his education was acquired during his working hours from reading and studying by himself. His health failing, he gave up the philosophical instrument business in 1858, and removed first to Radnor, then to the hamlet of Sugartown, Chester Co., where he died a few years ago.

of soft wood; the daguerreotype plate was held in place by four ordinary carpet tacks, and the grooves were made so as to fit the camera, fuming-box, and mercury bath. To protect the sensitized plate a flap lined with black velvet was used, hinged to the back proper, and controlled by a strip of leather which was pulled through a slot in the side. When all was ready for the exposure, a tap or two on the camera dropped the shutter, and when the exposure was complete a pull on the leather thong closed the flap, and protected the plate. The plates used were 4¼ by 6½ inches.

The fuming-box, 8 by 6½ inches and 6½ inches high, had a novel arrangement for fuming the plate evenly. A piece of wood was so placed between plate and chemicals that it could only arise about the sides of the box, thus insuring an even coating.

The mercury bath was an ingenious contrivance, which when folded measured 9 by 5½ inches and 11 inches high. When set up it was 6 inches higher, the latter forming a space under the iron mercury bath for the spirit lamp used to heat the mercury.

The iodine, bromide, and mercury used were kept in glass-stoppered bottles which fitted into the fuming-box.

Such was the primitive apparatus with which was solved the question of heliographic studio portraiture half a century ago. It is, however, a noteworthy fact that all the early processes in photographic portraiture achieved in Europe and America were gained by the use of apparatus modeled after the primitive Philadelphia outfit here described, together with the chemical discoveries of Philadelphia scientists. For many years some of the most noted daguerreotypists in Europe were Americans, as for example Mayall in London and Thompson in Paris. Further, a reference to some of the old advertisements will show that many of the most celebrated native French, English, and German operators in their respective countries advertised *Daguerrean Miniatures by the American Process.*[2]

The above outfit has lately come into the possession of the writer, in precisely the same condition as when last used in

[2] Humphrey's *Daguerrean Journal*, Vol. I., p. 25, November, 1850.

October 1840. The camera, fuming box, mercury bath, chemicals, holders, even to a coated plate in the holder, all just as they had been stored away in 1840,—over half a century ago.

The circumstances connected with this interesting discovery are as follows.

Shortly after Cornelius opened his studio at Eighth street and Lodge Alley, Dr. Paul Beck Goddard also fitted up a studio in his house on Ninth Street above Chestnut, opposite the University of Pennsylvania. During the fall term of 1840 Dr. Goddard was called to act as demonstrater of anatomy (permanently appointed 1841), which required all of his time and attention. He then offered his whole Daguerrean studio outfit, a duplicate of that used by Robert Cornelius, to the now well-known engraver, John Sartain, then a young man just starting upon his brilliant artistic career.

Our historical retrospect being brought to the attention of Mr. Sartain, who is now in his 84th year, he recalled the circumstances of his Daguerrean experiences of over half a century ago; further that the whole of Goddard's apparatus must still be stowed away in the loft of the residence formerly occupied by him in Sansom street in Philadelphia, there he placed it fifty-two years ago.

He at once sent word to the writer, whom he has well-known for over a quarter of century. An investigation proved that Mr. Sartain was right in his surmises, and there, stowed away in an out-of-the-way closet in the unoccupied house, were found the interesting relics of photography, covered by the dust of years, after an undisturbed rest of over half a century.

Mr. Sartain, whose mind and memory is still as clear and bright as his eye, recognized each part and piece when brought forth just as if they had been left but a week ago. Upon being asked as to the circumstances of his connection with photography he stated that the first imformation he received of the discovery was at a reception to the "Artist Fund Society," held in the latter part of 1839, at the house of a well-known architect, who lived on the north side of Filbert street, above Eighth. At this gathering a letter was read from Samuel Morse in Paris, relative to Daguerre's process. This was received with considerable

ridicule by most present. After the discussion the consensus of the meeting was that they could believe Herschel's moon story, but this one—never. One of the strongest opposers to Daguerre's claim was the speaker, John Sartain.

However, after Saxton had demonstrated the correctness of the invention, Mr. Sartain became greatly interested in Daguerre's process, and was a frequent visitor at Dr. Goddard's house. After the latter received his appointment as demonstrator of anatomy, he offered to sell to Mr. Sartain his whole studio outfit for the sum of forty dollars. This offer was finally accepted, and Mr. Sartain came into possession of the only studio outfit in America except Mr. Cornelius'.

At this time the Franklin Institute was holding an exhibition in the old Masonic Hall on Chestnut street. To give additional space the lawn in front of the hall had been enclosed with a wooden structure covered over with sheet iron. Mr. Sartain, the Chairman of the Committee on Fine Art, attempted to make a daguerreotype showing the annex with the hall in the background. For this purpose he placed the camera on the sill of a second-story window of a house opposite to what is now the Washington House. After the exposure was made, and removed to his house for development, it was found to be over-exposed. Mr. Sartain then rubbed the image off, and ground the plate on a buff, first with pumice-stone, then rotten-stone, and finally with rouge. On the next day Mr. Thomas P. Cope, a well-known Friend and shipping merchant, called on Mr. Sartain to take a daguerreotype of Haverford College,[3] to be engraved and used as a frontispiece to a pamphlet report for that year. Among the plates prepared was the one above described, and by some chance it was the one exposed on the celebrated Quaker College. Mr. Cope, desirous of seeing the development, returned to the city with Mr. Sartain. When the plate was put in the mercury box, to the surprise of both watchers, straight lines appeared upon the plate. These soon changed into the buttresses and tall Gothic windows of the Masonic Temple, showing over the roof of the shed in front. In fact, when finished the original picture of the

[3] Nine miles west of Philadelphia.

previous day was on the plate,—not a vestige of the second exposure was to be seen. This curious plate remained in Mr. Sartain's possession for many years, and may be still in existence.

This second failure in Mr. Sartain's attempts at daguerreotypy so disheartened him, that the apparatus was put away, and there lay undisturbed and forgotten for so many years, until now resurrected at the instance of the writer.

The Focometer.

Of the many trials which beset the early experimenters in the Daguerrean process, none were greater than to obtain a suitable lens, and after one was obtained to know whether or not it worked to focus. For this purpose an instrument known as the focometer was improvised. It consisted of a stand, upon which eight small fans were arranged in a spiral form around a horizontal axis at different distances, so as to be all visible at once from the lens. These fans were numbered from one to eight, and when it was desired to try a lens the focus was taken upon No. 4. If in the finished daguerreotype that number proved to be the sharpest, the lens was right, and worked to focus. If No. 2 or No. 3 were sharper, then the lens had to be racked so much nearer the ground-glass after the focus was taken upon the sitter or subject. On the contrary, if No. 5 or No. 6 were the sharpest, then it proved that the lens was over-corrected, and had to be drawn out a little further away from the ground-glass.

Fig. 3.

The method of testing a lens for flatness of field in the early days of photography was simply to expose upon a window sash, which in those days always contained a number of small panes of glass. If all the bars appeared upon the ground-glass perfectly straight, it was proof positive that the lens was suitable for a photographic objective.

COLOR PHOTOGRAPH OR COLOR VALUE.

OUR sparkling neighbor, the *Photographic Pointer*, in its last issue, publishes a leader under above title, in which it is set forth that "No little harm has been done in the past, and will probable continue to result in the future, from the way in which many of the daily and other papers have reported and commented on the various attempts of scientists to reproduce by photography the value of colors.

"A majority of such commentators seem to jump at the conclusion, and to expatiate thereon, that photography claims to have the ability of reproducing on a sheet of sensitized paper, in the form of a positive print, in the colors of nature, to a greater or lesser degree, such subject as may be placed before the camera.

"It is a pity that public sentiment should be so imposed upon as it has been in this instance, for while the future may perhaps hold in store this possibility, those searching now for the solution of the color problem are much more modest than this would seem to indicate, and feel that a great advance will be made when it is found possible to obtain negatives that will reproduce with fidelity the varying gradations or tones of color as they may be translated into the black and white of the reproduction.

"This is rapidly being approximated by the orthochromatic plates and the use of colored glass, but the general thought of the unsuspecting and wrongly-informed public is, when color photography is mentioned, that it refers to something entirely different from what it really is.

"Let, then, the more enlightened of us take every possible occasion to correct this wrong and injurious impression; let us talk and work for color *values* in photography; and when we have made the public understand what is meant by color photography, much will have been accomplished for the art."

In connection with this subject we will recall to our readers' attention the illustrated paper published in the AMERICAN JOURNAL OF PHOTOGRAPHY, May, 1891, page 202, giving a "suggestion for identifying the colors photographed," a scheme and illustration which is thus far the nearest approach to reproducing mechanically color values by photographic means.

A COLUMBUS DAY JAUNT:—ITS EXPERIENCES AND DISAPPOINTMENTS—PHOTOGRAPHY AND SUPERSTITION.

BY J. FOCUS SNAPPSCHOTTE.

DURING the early fall of the present year of grace, 1892, several members of a well-known Philadelphia society planned a jaunt to the interior of northeastern Pennsylvania, the objective point being one of those quiet out-of-the-way Pennsylvania towns where Pennsylvania German is the spoken language, and where, thus far, but few or the modern innovations have, as yet, invaded the quiet life of the community. The object of the proposed excursion was a two-fold one: first, to obtain some historical and genealogical matter; secondly, to escape the noise and bustle of "Columbus Day."

To accomplish the full aim of their main object it was necessary to have a photographer join the party. For this purpose approaches were made to a member of the old Leopardville Camera Club. The inducement set out was a sojourn at the leading tavern in the town, the host of which had achieved a more than local reputation for his broiled spring chicken and waffles. If the photographer, whom we will recognize as Mr. Snappschotte, has a marked weakness, it is for spring chicken and waffles. The bait was offered—and taken. For the intervening week the dreams of Snappschotte were interspersed with visions of waffles, chicken, apple-butter, cider, and coffee, such as are only to be had among the Pennsylvania-Germans. These visions were followed by dreams of several nights' rest in a soft, downy feather-bed, relics of years gone by—at present only to be found in a community like the one which it was proposed to visit.

To make doubly sure that there should be no disappointment, the projector of the jaunt, whom we will call "Textor," wrote to mine host of the party's coming, and good accommodations were expected, with an unlimited supply of waffles and fixings.

At last the day of the eclipse, which preceded Columbus day arrived, as announced in the almanac. In the afternoon when

the party met at the railroad station it had dwindled down to three persons, Textor, Historicus, and Snappschotte, the button-presser.

It was four o'clock when the train pulled out with the trio aboard; four hours later three hungry and weary traveler alighted at a quiet town which nestles at the base of the Blue Ridge. Quite a number of country people disembarked at the small station platform. This in itself was unusual, if not remarkable, but was explained when one asked in local "Bush-Dutch," at what time the eclipse was to come off? They had heard there was to be an eclipse of the sun that day, and so had come to town that night after work was done to see it.

The three travelers, leaving the station, wended their way up the main street. One of the first persons they met was the town constable going his rounds, extinguishing the street lamps prior to his retiring for the night. On seeing that three strangers had come to town, he re-lit the lamps, and allowed them to burn until half-past ten o'clock.

At last the chief tavern was reached; never had the camera-box and outfit of Snappschotte's felt lighter than during the long tramp from station to tavern. In this he was not alone: Historicus for the nonce brushed away the musty cobwebs of history from his brain, while Textor, with the step and elasticity of youth, cared not whether his family tree ran back to Noah of old or stopped short with the original Evan ap Evan. All this was in anticipation of the prospective waffles and chicken, to be followed by the downy couch of sweet repose. The trio, however, were doomed to a sad disappointment. The host, in place of the genial Pennsylvania-German Boniface pictured in the mind of Snappschotte, turned out to be what might be called a veritable Philadelphia Yankee, and what was more, there were no waffles, no chicken, no coffee, no apple butter, no cider—in fact, no supper. In explanation the tavern-keeper stated that he had forgotten the date of our party's coming, so had made no preparation. When reminded in forcible language that it must be a mistake, as he had sent Textor a postal card no later than the day before, his only excuse was a lame apology. After a dreary wait supper

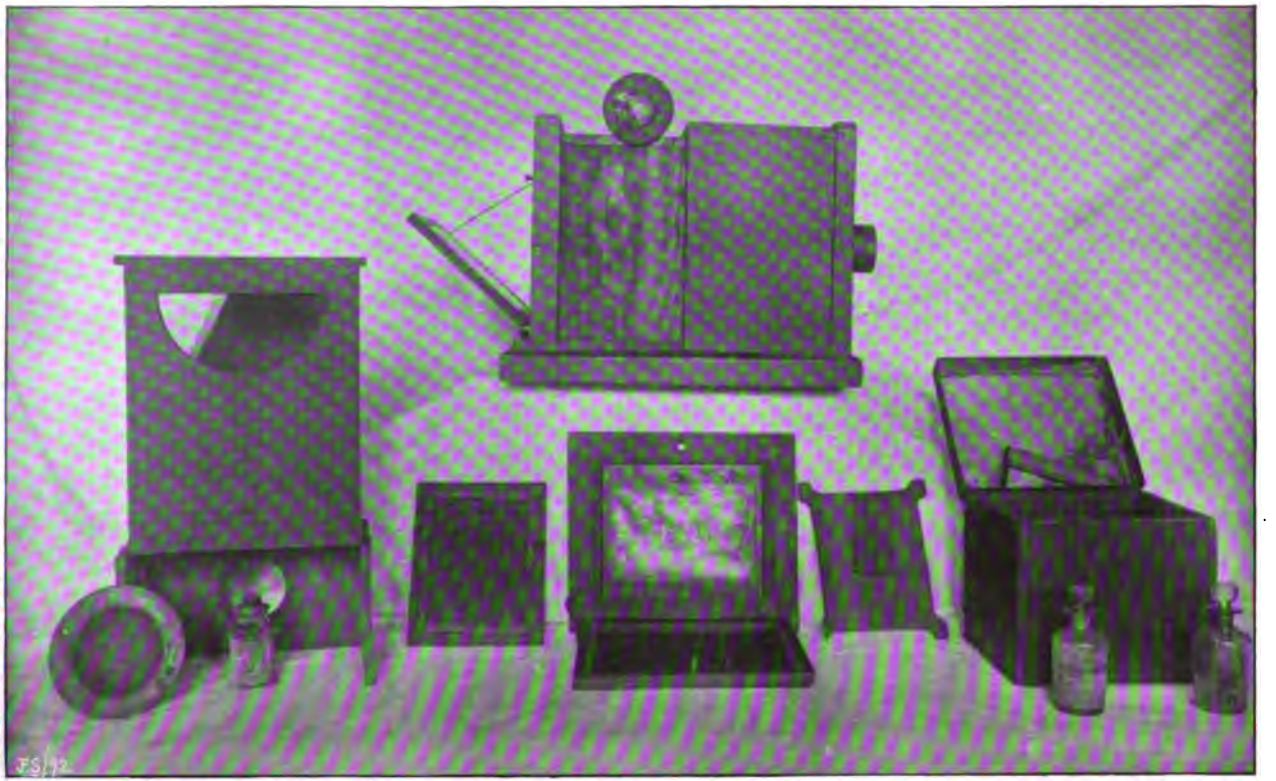
was announced—"tenderloin" steak, well out of the neck, a fried egg, and a cup of coffee which for strength would pale the proverbial stable goat, took the place of the anticipated feast of tender fowl and lucious cakes.

During the supper the host offered more apologies; the apple butter should surely materialize to-morrow. However, the three tourists reconciled themselves with the thought of a good night's rest. After supper segars were lit, and a stroll taken through the peaceful town. So honest is the community that but few residents bolt or bar their houses at night-fall. It is not an unfrequent occurrence that front doors are left open all night in summer, with no greater risk than to find a stray horse or cow in the vestibule in the early morn.

Promptly at half-past ten the street lights were once more put out, as a reminder for all persons to retire. Returning to the tavern the party were ushered into two chambers, anything but tidy; one contained a bed and cot, the other a bed. Snappschotte secured the latter, Textor the cot, and Historicus the other bed. The visions of downy rest had vanished. Snappschotte's mattress seemed to be loaded with corn husks, Historicus' bed was about a foot too short, and the cot,—well, Textor declared in the morning that the absence of waffles the night before was now accounted for, as the irons must have been put in the cot in place of a mattress.

Long before daylight the trio were up and dressed, and comparing notes, and the work of the day mapped out. To get out of the stuffy tavern was the first idea; so a walk before breakfast was proposed—a happy thought, which not alone gave the jaunters an appetite for breakfast, but also an insight into the town life, even if it did take away all desire for apple butter.

The first thing to attract attention was a man going through the town, stopping at different houses, pounding at the doors and calling to certain persons to "*steh auf de Stahdsch is hier in a halber stund.*" This proved to be the stage proprietor, who personally awakened all citizens who had booked with him for the early stage. Another peculiarity was that women seemed to see how early they could get up and sweep off the foot-walks.



STUDIO OUTFIT OF DR. PAUL BECK GODDARD, PHILADELPHIA, 1840.

Lens and Shutter.
Camera with body extended, showing mirror set for focussing.
Fuming box ready for use, with glass to view process during development.
Iron mercury bath. Brass spirit lamp.
Plate holder, with original coated plate open for exposure.
Tray for chemicals used in coating plates.
Diffuser for Vapor.
Coating box, with rake to distribute chemicals on tray.
Mercury bottle. Iodine bottle.

PHOTOGRAPHED BY JULIUS F. SACHSE, WITH WRAY LENS ON ORTHOCROMATIC PLATE.

REPRODUCTION IN HALFTONE BY ELECTRIC LIGHT.

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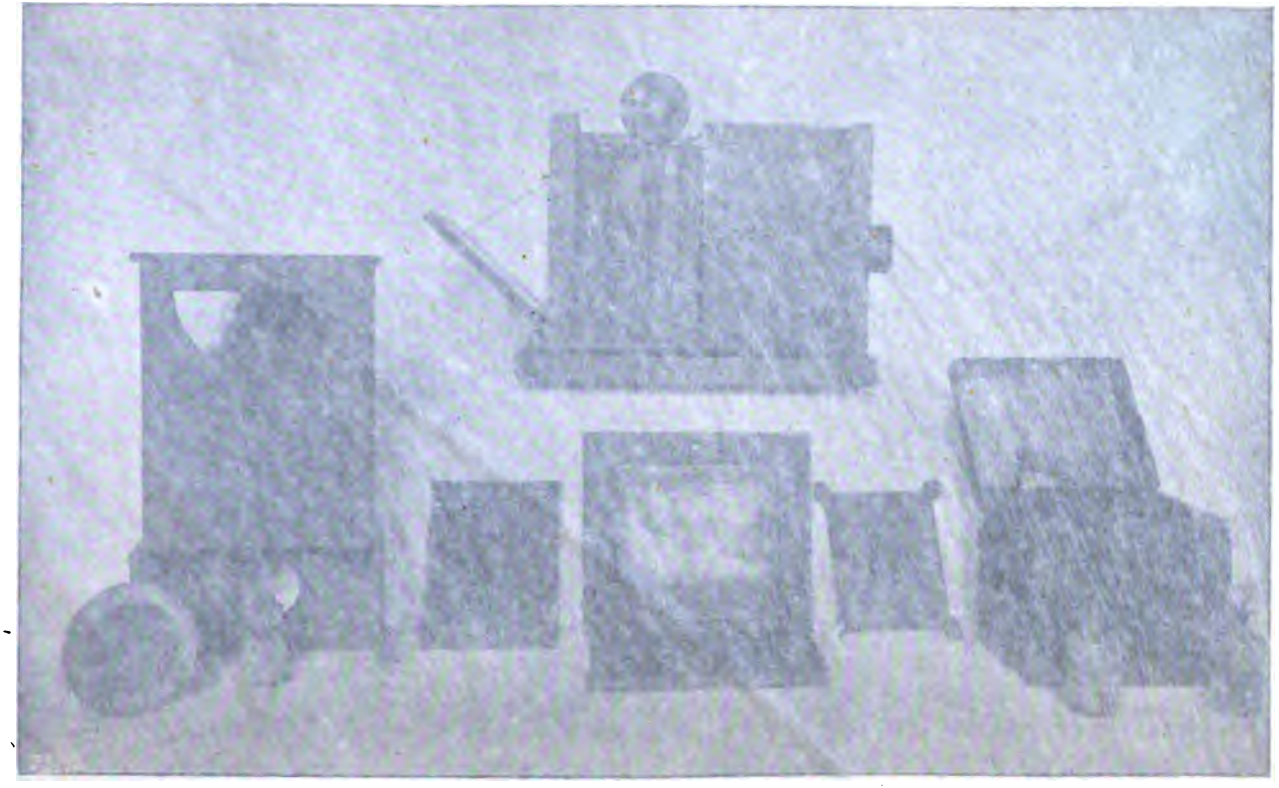

STUDIO OUTFIT OF DR. PAUL BECK GODDARD, PHILADELPHIA, 1840.

As it neared breakfast time the trio turned their steps toward the tavern. On their way they overtook a farmer who was selling from house to house *Lotwerck* (apple-butter) by the quart out of a deep firkin. Stopping for a moment to listen to the colloquy in rich local German, between seller and buyer, the party were cured from eating apple-butter during that trip. The two had come to terms; a quart was ladled out into a stone dish, and paid for; in the meantime something in the mass attracted the attention of the buyer. An investigation proved it to be a dead mouse. The seller refused to take it back, and said that the mouse made no difference; it did not hurt the apple butter; it must have got in during the night, as any one could see the mouse had not been cooked with the apples, but as long as he had found it he would refund one half the price, or give him another quart without the mouse. The trio did not stop to hear any more, but when apple butter was set before the party at breakfast, with the information that it was nice and fresh, and had just been bought of a farmer expressly for them, it is needless to say that the soggy griddle-cakes were lubricated with the strong creamery butter and cheap treacle of the tavern menu.

After the repast the trio again ventured out into the town, and among the peculiar primitive customs of the residents none attracted more attention than to see an old lady come out of her house, carefully lock the front door, place the key under the door mat, and then calmly go her way.

As the morning progressed, while Historicus was gathering historical information, Textor delving into family records, Snappschotte was photographing some of the quaint old landmarks of the town. As noon approached all the plates in the holders had been exposed. The three pilgrims meeting, a search was made for the local photographer, if such existed, for the purpose of soliciting the use of his dark-room to change plates and secure those exposed. Arriving, after inquiry, in front of the studio, quite a crowd blocked the entrance. This seemed strange, but thinking some accident had occurred, Snappschotte asked a respectable looking cilizen what had happened, and if he knew if the photographer was in. The reply, given in English, was that

no pictures were made on that day, as it was "his day." Asking for an explanation, the citizen seemed surprised at the ignorance of the questioner; he, however, continued that this was the first Friday of the new moon, and the great healing day of the quarter; further, that the photographer was a "Faith Doctor," being a seventh son of a seventh son, born with a caul, under a peculiar conjunction of stars, and thereby had the mysterious power to make a picture of a person by sun'light, [Photography.—ED.] and cure all diseases by the mere laying on of hands, a power greater than any medicine doctor in the world possessed.—It was some minutes before the jaunters could believe their own ears. Looking around among the throng more closely, it seemed as if all the halt and decrepit for miles around were assembled in the street before the narrow entrance of the photographer's studio. Snappschotte and Textor, making their way with the crowd, finally squeezed up the narrow stairs, and after going up three flights got into the studio and stood in the presence of the Doctor-Photographer, who proved to be a sedate, ministerial-looking man, dressed in sombre black. The studio did not differ from the typical village gallery as seen in any country town, except that it was well filled with people, all awaiting their turn to be cured of their ailments.

Snappschotte's application for the use of the dark room was courteously granted. After reloading holders the three strangers mingled with the crowd on the stairway and street, where it was learned that most persons had implicit faith in the Doctor's powers, who gave no medicine but merely laid on his hands and spoke words. It was also learned that no charges were made, but any one could leave upon the counter as much cash as their circumstances would permit.

Seeking admission was a Pennsylvania-German farmer with his son, a boy of about fourteen years. Asking the boy's ailment, the father said that he thought the boy had a "greedy worm," and all he wanted was the doctor to rub his hand three times down the boy's back, when the "greedy worm's" head would be cut off. The greatest surprise, however, was the number of persons in the crowd who seemed to connect the process of photography

with the occult powers which gave the operator the healing power.

That such ignorance and superstition should exist in this enlightened age, in an old and religious community, as is this quiet, peaceful Pennsylvania town in question, was such a revelation to the three visitors from the Quaker City, that even the unsatisfactory accommodations at the tavern, with the attendent disappointments, were forgotten for the time.

Making their way to the little railroad station, the dust of the town was shaken off their feet, and the journey started for home. So greatly was the trio puzzled over their experiences of the last few hours, that during the homeward trip Historicus attempted to connect the matter with the Salem witchcraft of old, while Textor attempted to trace back the Photographic-Doctor's pedigree to the ancient female interviewed by Saul in days gone by.

The most dejected and miserable of the trio, however, was Snappschotte. During the whole of the excitement he forgot that he had his outfit, and thus neglected the opportunity of his life-time in not exposing upon the motley crowd which besieged the studio entrance of that quiet town where photography and superstition go hand-in-hand.

The Historical Society of Pennsylvania, one of the most active organizations of the kind in the world, has lately taken another step forward, which places it still further in advance of similar societies in this country, by the virtnal organization of a Photographic Department, by which students of history are enabled to procure photographic copies of the priceless documents and treasures stored in the archives of the institution, while the Society at the same time is sure of the proper and safe manipulation of the originals, which would not be the case if permission were granted promiscuously to all applicants.

The Photographic Department is in charge of Julius F. Sachse, Esq., Editor of the AMERICAN JOURNAL OF PHOTOGRAPHY, who, in addition to his other scientific labors, has made the photographic reproduction of manuscripts, documents and oil portraits an especial study.

ON SILVER HEMISULPHATE.

BY M. CAREY LEA.

THE existence of those substances which I described some years ago under the name of photosalts of silver,[1] necessarily implied the existence of the hemihaloids of silver, also, as these latter entered into the composition of the photosalts. Similar inferences, though less definite, had long been drawn from the action of light on silver haloids. Two of these, the chloride and bromide, lost by the action of light their complete solubility in ammonia without becoming completely soluble in nitric acid. Evidently there was indicated an intermediate compound between the normal haloids and metallic silver. During the last ten or twelve years I have devoted much time to the attempt to isolate these lower compounds of silver, and to gain some certain knowledge as to the hemioxide, whose existence seemed almost a necessary inference from that of the hemihaloids. Some eight years ago, I obtained a substance having all the properties which one would be disposed to ascribe to Ag_2Cl, and a large number of analyses made seemed to confirm the view. I hesitated, however, to publish a description of it, not feeling entirely certain that it might not be a mixture, as to which a concordance of the proportions found of Ag and Cl with theory gives no sufficient information. Since then M. Guntz has described a subchloride obtained by acting on silver hemifluoride with phosphorus pentachloride and a hemioxide derived from it. Up to the present time no combination of silver hemioxide with an oxyacid has been known.

Such a combination I have been able to obtain as a double salt of hemisulphate and normal sulphate containing one molecule of each. The new salt has a light bright brown color, and exhibits a stability which, in view of its composition, is something remarkable. It has no tendency either to oxidation or to reduction. Nitric acid, unless very strong, has but little action upon it. Acid of 1.42 poured over it in large excess, and let stand

[1] The American Journal of Science, XXXIII., May and June, 1887.

for several days, gradually dissolves it completely, but the same acid diluted with two or three times its volume of water has so little action that it forms a convenient means of purification. On the other hand, ferrous sulphate, which instantly reduces argentic sulphate, has no action whatever on the new substance, even with several days' contact. Hot strong sulphuric acid has no action. It might almost be expected that under its influence the argentous salt would gradually take up oxygen and be converted into argentic sulphate. But a specimen which was covered with a large excess of undiluted sulphuric acid in a flask, and was kept under boiling water for ten hours, was not altered thereby. Another strong proof of its stability is found in its resistance to heat.

The application of heat produces a somewat curious succession of colors. The terra cotta or warm brown shade of the moist substance changes by drying above 100° to pale lilac, at 165°–170° it becomes grayish, at a somewhat higher temperature, yellowish green. Considerably below red heat it acquires a fine ruby-red color. In cooling, this red darkens almost to black, then becomes lighter again, and when cold the color is light olive-green. The changes are repeated as often as the substance is heated and cooled. No sulphuric acid vapors are disengaged even at a low red heat.

It was mentioned in a previous paper that when silver nitrate is reduced by solutions of phosphorus or hypophosphorous acid, or by acidified solutions of their alkaline salts, transient colorations were produced that seemed to suggest the presence of some form of allotropic silver. Since that paper was published this reaction has been taken up for further study. It soon appeared that when the silver salt was treated with a solution of alkaline hypophosphite, acidified with sulphuric acid, the result obtained was entirely different from that which presented itself under any other circumstances. It became clear that sulphuric acid did not act solely by setting free the hypophosphorous acid, but also acted on the silver with formation of a double sulphate.

A remarkable though limited analogy here presents itself between the substance just described and the photosalts of silver.

The silver hemihaloids are very unstable substances, but acquire stability by uniting with the normal haloids. In the same way the hemisulphate, which is not known to be capable of separate existence, becomes perfectly stable by union with the normal sulphate. The limitation to this analogy lies in the fact that the last-mentioned combination occurs in definite proportions, which does not seem to be the case with the halogen compounds.

The new substance then is formed by the joint action of sulphuric and hypophosphorous acid on a silver salt. Hypophosphorous acid has but little action on silver sulphate already precipitated, but it is different when the silver sulphate is formed in presence of hypophosphorous acid.

Several silver salts may be used. I have at different times employed the nitrate, phosphate and carbonate. The latter is perhaps the best, because the action with the nitrate is too rapid, and with the phosphate too slow, and for other reasons.

A weighed quantity of silver nitrate is precipitated with an excess of alkaline carbonate and washed. The carbonate, as well as all the other reagents employed, must be absolutely free from chlorides, otherwise the product becomes contaminated with silver chloride which cannot be removed. The silver carbonate is then treated with a solution of alkaline hypophosphite acidified with sulphuric acid. All the alkaline hypophosphite of commerce contains much more than a trace of chloride: this is best got rid of by adding to its solution a little solution of silver nitrate, stirring well at intervals, letting stand for twenty-four hours and filtering. This filtrate with addition of sulphuric acid is to be poured over the moist silver carbonate and constantly stirred. The reaction is complete in twenty or twenty-five minutes, when a bluish-black film of reduced silver begins to form on the surface. Further action is then cut short by neutralizing the liquid with alkaline carbonate. The precipitate is next to be washed several times by decantation. Very pure distilled water is, of course, needed throughout.

Convenient proportions are; 40 grams silver nitrate precipitated with excess of alkaline carbonate. Of sodium hypophos-

phite, 100 grams, dissolved in 650 c.c. of water, are treated with a little silver nitrate, and after standing and filtering, 4 c.c. of sulphuric acid are to be added and the liquid poured over the silver carbonate. After a few minutes, 6 c.c. more of sulphuric acid, diluted with a little water, are added by degrees. With this second quantity of sulphuric acid the characteristic reddish-brown color of the substance first appears.

This process may be varied by precipitating with disodic phosphate (which must be perfectly free from chloride) instead of alkaline carbonate. The action is much slower, about 24 hours being needed. Silver nitrate itself may be used, but the action is too rapid and the product is less in quantity.

The crude product obtained in either way is to be purified with nitric acid. Acid of 1.42 is diluted with three times its volume of water, and of this dilute acid a quantity is taken about double in volume to that of the precipitate and of the water left after decanting closely. After a time some effervescence takes place, but the mixture does not become warm. After standing for three or four hours over the precipitate, it is to be poured off and the precipitate washed. This treatment with acid is applied three times: the first removes a good deal of silver, the second a little, the third a trace. Each time the acid is left three or four hours in contact. The product is then washed by pouring on it a large quantity of boiling water. This is repeated four or five times, each time (except the first) placing the vessel in a water bath kept at 100° C. for several hours.

The product is either dried in the air or (for analysis) at 100° C. It forms a bright brown substance, permanent in the air, changing to violet when kept for some time at 160° C. It has the peculiarity that when water is poured on it, it makes a sharp hissing noise. This takes place with the air-dried substance as well as that dried at higher temperatures, and as much with the former as with the latter.

The substance after purification has about one-half the weight of the silver nitrate taken.

These proportions and this mode of operating are those that I have found to give the best result. But the substance is formed

under a great variety of conditions. It seems impossible to bring a silver salt in contact with alkaline hypophosphite acidified with sulphuric acid without producing more or less of it. Its presence is often completely obscured by reduced silver. But a mass that looks perfectly black and might be supposed to contain nothing but metallic silver will leave, when treated with nitric acid, a bright brown residue of the double sulphate. We have here, as before, an analogy with the photosalts. For it will often happen that a blackish mass, containing metallic silver and mixed or combined silver chlorides, will, when treated with nitric acid, resolve itself into bright purple or rose-colored photochloride.

All the specimens of this new substance contain a little phosphoric acid which cannot be removed. Reckoned as phosphoric anhydride it amounts to a little over two per cent. Three determinations gave respectively, 2.30; 2.09; 2.18, mean 2.19.

It is apparently united with silver, and this silver phosphate is united so firmly with the double sulphate that it cannot be detached. If it were not so united it would be dissolved in the nitric acid with which the substance is three times treated if it were normal phosphate, and if it were hemiphosphate it would be converted (if in a free state) to normal phosphate and dissolved.

Another attempt to remove this phosphate was made by heating the substance with sulphuric acid to 100° C. for ten hours, followed by copious treatment with boiling distilled water to wash out the sulphate which it was hoped would be formed at the expense of the phosphate. It seems difficult to believe that a silver phosphate could resist this treatment, but a quantitative determination showed that the proportion of phosphoric anhydride is not even diminished by it.

Other modes of formation than those described here were experimented on with the view of obtaining the substance free from phosphate, but without good result.

It is possible that the silver phosphate may be combined in definite proportions and the approach to uniformity of composition somewhat favors this idea. But such a view would require the assumption of a large, perhaps too large a molecule.

Analyses.

A. Material prepared from silver carbonate and dried at 100° C.

	(1)	(2)	Mean.
Ag - - - - -	76.13	76.75	76.44
O - - - - -	3.29		3.29
P_2O_5 - - - - -	2.30	2.09	2.19
SO_3 - - - - -	16.19	16.47	16.33
Water - - - -	1.78		1.78
	99.69		100.03

B. Material prepared by various other methods considered less reliable.

Determinations.

Ag per cent.	P_2O_5	SO_3	O
78.59			3.93
78.45			3.69
77.16			3.61
75.43	2.18	15.61	3.29
75.46			3.25
75.35	1.77		
Mean 76.74			Mean 3.55

The determinations of phosphoric and of sulphuric anhydride are placed opposite the silver determinations to which they belong. The oxygen determinations are distinct.

The most reasonable interpretation of these results is that we have to do with a double sulphate of silver hemioxide and protoxide in which a portion of sulphuric acid is replaced by phosphoric. The proportion of phosporic acid seems to be nearly constant, three concordant analyses having given 2.09, 2.30, and 2.18, with a mean of 2.19. These proportions may be expressed by the formula

$$7(Ag_4SO_3Ag_2SO_3H_2O)+Ag_6PO_4Ag_3PO_4.$$

The comparison of this formula with results obtained is as follows:

	Calculated.	Found (Mean.)
Ag - - - - - -	76.79	76.44
SO_3 - - - - - -	15.67	16.33
P_2O_5 - - - - - -	1.98	2.19
O - - - - - -	3.80	3.29
H_2O - - - - - -	1.76	1.78
	100.00	100.03

This large molecule results from the relatively small proportion of P_2O_5, and although the figures obtained for phosphoric anhydride are very concordant, it perhaps is better to consider the substance as a double sulphate in which part of the sulphuric acid is liable to be substituted by phosphoric. If the silver phosphate is taken as adventitious, the formula becomes simply Ag_4SO_4,Ag_2SO_4,H_2O.

Decompositions.—The action of alkaline hydroxides is confirmatory of the above conclusions, and also offers further proof of the great stability of the substance.

When the double salt is placed in contact with excess of dilute sodium hydroxide it blackens, being converted into a mixture of the hemioxide which is intensely black, and the normal oxide. This decomposition, however, takes place much more slowly than with the salts of the protoxide, so that (unless heat has been applied), if after ten or fifteen minutes the alkali is poured off and the oxides are dissolved with dilute nitric or sulphuric acid, a considerable residue is found of the red-brown double salt which has escaped decomposition.

With continued treatment with sodium hydroxide (that obtained from metallic sodium was used as being absolutely free from chlorine), the decomposition is complete.

The oxide thus precipitated was thoroughly dried at 160°–170° C., weighed and ignited. Five determinations of oxygen from various specimens gave 4.73; 4.63, and again 4.24; 4.19; 4.17 per cent. of oxygen respectively. A salt with the constitution already described should yield one molecule each of hemioxide and of normal oxide, and this mixed oxide should contain 4.68 per cent. of oxygen. We have then:

	Mean of 5 determinations.	Calculated.
Oxygen per cent. - -	4.39	4.68

The double salt is more readily decomposed by hydrochloric and hydrobromic acid or even by alkaline chlorides or bromides. Under their action it instantly blackens. That part of the silver that exists in the form of hemisulphate is converted into black hemichloride or hemibromide. The extreme instability of these hemihaloids causes them spontaneously to resolve themselves into metal and normal haloid. They rarely remain as hemihaloid for more than hour or two, and often for much less time. The change is often quite sudden, and is easily observed by the alteration of color, the black of the hemihaloid passing into the metallic gray color belonging to a mixture of normal haloid with metallic silver. The hemibromide seems to be little less unstable than the hemichloride.

This instability does not render an analysis impossible, since both the products of the change are insoluble; but renders it somewhat more difficult, as the freshly-formed silver haloid tends to run through a filter. Sometimes indeed it seems as if traces of the silver chloride were for a few moments soluble in water with a yellow coloration. The appearance of this yellow color in the water is apt to be the first indication of the splitting up of the hemichloride.

Two analyses were made, one of material obtained by acting on the brown salt with dilute hydrochloric acid; this contained 81.79 per cent. of the silver. One by decomposing it with sodium chloride; this gives 81.93 per cent. A substance having the formula already given should, by conversion into chloride, give a mixture in which two-thirds of the silver should exist as hemichloride, and one-third as normal chloride. We have then—

	Found 1	Found 2	Mean.	Calculated.
Ag per cent. -	81.79	81.93	81.86	82.35

a result sufficient close to afford a confirmation of the constitution assigned.

When the brown salt is decomposed with dilute hydrobromic acid or an alkaline bromide, a corresponding result is obtained. By treatment with hydrobromic acid a mixed bromide resulted which proved to contain 66.06 per cent. of silver.

A general consideration of all the reactions which I have obtained seems to indicate that the action of sulphuric acid and sodium hypophosphite on silver carbonate does not lead directly to the production of the double salt which I have described, but that the hemisalt is produced in excess, often in large excess; that the nitric acid oxidizes this excess, being able to attack the *free* hemisalt, but not that portion which is combined with proto-salt and so rendered stable. It follows that whatever has been the original relative proportion between the two salts the nitric treatment leaves always one molecule of each. If it were possible to control the formation it is not improbable that a pure hemi-sulphate might be obtained. But the action of the hypophosphite tends so strongly to carry the reaction still further that reduced silver appears, and in removing this with nitric acid the double salt results. A confirmation of this is found in the fact that the treatment with nitric acid much reduces the deep terra-cotta color of the original product. If this difficulty can be overcome we may yet obtain hemisalt isolated.

There is reason to suppose that numerous other compounds of silver hemioxide with oxyacids may exist. These compounds cannot be obtained by acting on the normal salts with sodium hypophosphite or with hypophosphorous acid, but it appears probable that they may be produced when the normal salts are formed in the presence of sodium hypophosphite. If to the last named salt we add a solution of a salt capable of precipitating silver nitrate, and then further add silver nitrate, we obtain precipitates which after standing some hours with frequent stirring appear to contain compounds of silver hemioxide. But these products do not resist the action of nitric acid; consequently there appears to be no means of purifying them and of deciding with certainty as to their nature.

When sodium citrate and hypophosphite are dissolved together and a little silver nitrate added to get rid of chlorides, then after

standing and filtering more silver nitrate is added, a precipitate is obtained which after a time appears to contain silver hemicitrate in an impure form. When a little of this precipitate is put into much water containing a trace of ammonia (five or six drops to 100 c.c.), a fine rose-red solution results.

Most oxysalts of silver are darkened by light. In a paper published in this Journal for July, 1887, I mentioned that films of these salts exposed to light and then treated with dilute hydrochloric or hydrobromic acid appeared to be converted into hemichloride or hemibromide, and argued therefrom that oxyacid hemisalts of silver must exist, and be formed by action of light on normal salts. I believe that I have been able to prove the existence of a hemisulphate with a strong probability that many other hemisalts may be formed both by the action of light and also by purely chemical means. It is possible that at some future time we may succeed in obtaining some of these compounds in a state of purity.—*American Journal of Science.*

In the Early Days of California, the daguerreotype pioneers always enjoyed a rush of business for a week before the steamer sailed, then the only means of communication with the rest of the world. These likenesses were wanted to transmit to friends in the Eastern States and elsewhere, and were sent by mail or express via the steamers. So engrafted did this custom become that in some cases daguerreotypists stipulated that their rent became due or was payable upon "steamer days."

The day after sailing-day was a general holiday in most every gallery.

A Photographic Comet.—On the 14th of October last a very faint comet was discovered by Prof. E. E. Barnard at the Lick Observatory, by photography. Visual observations last night show the comet to be about one minute in diameter. It is of the thirteenth magnitude, and is moving southeast 1 degree 40 minutes daily. Its position tast evening at 7 hours 20 minutes, standard Pacific time, was 8 degrees ascension, 19 hours 34 minutes north, declination 12 degrees 3 minutes. This is the first comet to be discovered by the aid of photography.

THE INFLUENCE OF THE PHOTOGRAPHIC PRESS.

THE editor of our valued exchange, the *Photographic Review of Reviews*, in commenting upon our expose of the dollar outfit scheme differs somewhat with us as to the influence of the photographic press, and the area of its scope. Granted that it is the non-photographic reader who is the victim, and that the photographic press does not usually reach the class of people to whom the swindling advertisers appeal, the influence of the photographic press, however, is none the less, as it is recognized and quoted frequently by the respectable secular press, and in this manner does reach the gullible class who usually snap at the bait offered by the questionable premium offers, scattered so broadcast over the land chiefly during the winter months.

Any matter that has once been in print, it may well be said never dies; as an illustration, even while writing these lines there lies on the writer's desk a late copy of *Photographic Work* with a quotation from the *Philadelphia Photographer*, published twenty-three years ago, and a copy of a daily paper with an abstract from the *Photographic World*, a magazine which has been dead and buried for almost a generation. In two other cases where the whole edition was supposed to be destroyed by fire, yet a single copy in each case survived, and are now in possession of the writer. One case was the second volume of the late Marcus A. Root's "Camera and Pencil," the other an Ephrata broadside printed by the recluse monks in Lancaster County, Pa., which was ordered to be publicly burned as soon as printed, yet a single copy escaped to be found laid away in an old book after the lapse of 146 years.

Further, we have seen quotations from our genial reviewer in far western country papers thousands of miles away from old England, while from our own JOURNAL we have met with quotations as far away as India. In concluding our remarks we will say, Let no one undervalue the influence and importance of the photographic press; it has a field of its own, a circumscribed one it is true, but which in this country as well as in Europe is cer-

tainly ably tilled by practical and intelligent husbandmen, even if the harvest garnered is not always commensurate with the value of the crop, or the time, labor, and care which is bestowed upon the soil. J. F. S.

THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.

A STATED meeting of the Society was held Wednesday evening, November 9th, 1892, the President, Mr. Joseph H. Burroughs, in the chair.

The Board of Directors reported the election of the following active members: Messrs. Richard Paxson and William G. Hopper.

It was also announced that the President had appointed the following committee to conduct the Sixth Annual Photographic Exhibition under agreement with the Society of Amateur Photographers of New York and the Boston Camera Club: Robert S. Redfield, John G. Bullock, Charles R. Pancoast, Charles L. Mitchell, M.D., and Edmund Stirling.

The exhibition will be held April 17th to 29th, 1893, in the Galleries of the Pennsylvania Academy of Fine Arts, and every effort will be made to make it the most interesting and successful of the series yet held.

The resolution offered at the last stated meeting to amend the By-Laws so as to make a change in the meeting night, was discussed at considerable length, and finally, on motion of Mr. Coates, was laid on the table.

A number of photographic novelties were shown by Mr. Morris Earle, among which were: Celluloid trays of special construction, and made in various colors; a transparent tray with a well at one end to hold the developer when tray was raised to examine the negative through the bottom. He also showed and described the Frena Magazine Hand-Camera, made by Messrs. R. & J. Beck, of London. The camera used cut celluloid films, 3¼ inches square, the magazine containing forty such films.

Dr. Mitchell showed similar negatives made under similar conditions, with the Ross Concentric Lens and Ross Portable Lens, which afforded an opportunity for studying the comparative advantages of the two lenses for different classes of work.

An interesting collection of lantern slides was shown and described by Mr. John C. Browne, illustrating a recent trip made by him to Alaska.

Adjourned. ROBERT S. REDFIELD, *Secretary.*

The Editorial Dropshutter.

The present number completes the thirteenth volume of the AMERICAN JOURNAL OF PHOTOGRAPHY. A title page and complete index for the year is sent to every subscriber. The wise photographer, be he professional or amateur, will lose no time in having his journals bound, so as to have the volume of the year in a compact shape, handy for reference.

As to the value of the volume for the past year we can but repeat what was stated in previous years, that all we ask is a perusal of the table of contents as set forth in the index; so much for its intrinsic value. Then again a careful perusal of the whole volume will fail to show a single line or thought which would debar the journal from a place in any library or centre table in the land.

The editor has labored faithfully, and used his best endeavors to place the AMERICAN JOURNAL OF PHOTOGRAPHY in the foremost rank of periodical literature, and lay all genuine matters photographic before the interested public at large, without fear or favor to anyone. In this course he has been ably seconded by the publishers. In addition to technical photographic matters, and news and formulæ, we have given a number of literary papers upon various subjects,—scientific, artistic, educational, and historical, interspersed occasionally with humorous satire, while our page maintained throughout the year, "In the Twilight Hour," stands worthy of the attention of every reader.

Not the least of features of value to the photographic public are the advertising pages of the AMERICAN JOURNAL OF PHOTOGRAPHY, forming a complete record of the commercial feature of the art science, and where are to be found notices of what is new and novel in the market, as well as announcements and extra inducements held out by standard stockdealers. These pages are of especial value to every professional photographer, while to the advertiser they offer the best medium to bring his wares and announcements before the photographic public. That this is mutually recognized is apparent to all who have had experience with the journal.

That the editor's and publishers' efforts are appreciated by the public at large is evinced by the increasing subscription list. These efforts, if possible, will be increased during the following year; every nerve will be strained to keep the journal at the head of the photographic press in the country. In return, we ask the co-operation of our patrons.

Renew your subscriptions promptly, and if you have anything of value relating to photography, send it to us for publication.

In conclusion we will say, don't neglect to bind your volume. If you have no bookbinder, send the loose numbers to us, and we will have it done for you at a nominal figure. Renew your subscription or advertising contract as the case may be, and by these means let the editor and publishers know that their efforts are appreciated.

A Memorial Volume.—The authorities of the Moravian church in America contemplate issuing in the near future a Memorial Volume, as a fitting monument of the one hundred and fiftieth anniversary of the establishment of the Unitas Fratrum in America. The squi-centennial festivities celebrated with so much eclat in Bethlehem during the last week in June, were but a passing episode. The coming volume, however, will be a memorial which will last for ages, and be sought as an authority for centuries to come—as it will not only give the annals of the greatest Missionary Church of America, but virtually be a history of Northeastern Pennsylvania, covering both the colonial as well as the revolutionary period.

No society, church, or organization in Pennsylvania, with the single exception of the Historical Society of Pennsylvania, is so rich in colonial manuscripts, portraits, and sketches relating to provincial history as are the archives of the Moravian Church stored at Bethlehem.

For the first time within the history of the church are these priceless literary and historical treasures to be put into such shape as to be accessible to the general public, by the means of this Memorial Volume.

Not the least feature of this book will be the illustrations. Over one hundred full-page illustrations are already prepared, in addition to numerous embellishments printed in the text. These plates will reproduce almost all the quaint portraits painted by Haidt, the Artist Missionary, together with numberless sketches and views made by the old itinerating missionaries. Not the least curious is a reproduction of a sketch representing the baptism of the first three Indian converts baptized within the old chapel at Bethlehem, which is still standing.

The illustration of this Memorial Volume would have been impossible without the aid of photography. Thus far, though far from complete, it has necessitated the making of over five hundred negatives, over two hundred of which were special color-stained plates prepared expressly for this purpose. Most all of the photographic work had to be done within the walls of the archive room, with only such facilities as were at hand, there being no place where a copying bench or camera could be placed.

The subjects after being photographed have been reproduced by the photo-mechanical half-tone process, so as to present the best results, and obviate all questions as to their permanency.

No work thus far published in Pennsylvania has required so much photographic work and manipulation as the one in question. The illustrations of the completed Volume will stand as a triumph to photography, and the entire work will prove a lasting memorial to those devout men and women who a century and a half ago came to these western wilds to establish a Missionary Church, which should preach the gospel to all men, without distinction as to race, color, or nationality.

Avoid Forgetfulness.—A successful business man says there were two things which he learned when he was eighteen, which were ever afterward of great use to him, namely: "Never to lose anything and never to forget anything." An old lawyer sent him with an important paper, with certain instructions what to do with it. "But," inquired the young man, "suppose I lose it; what shall I do then?" "You must not lose it!" "I don't intend to," said the young man, "suppose I should happen to?" "But I say you *must not* happen to; I shall make no provision for any such occurrence; you must not lose it!"

This put a new train of thoughts into the young man's mind, and he found that if he was determined to do a thing, he could do it. He made such a provision against every contingency that he never lost anything. He found this equally true about forgetting. If a certain matter of importance was to be remembered, he pinned it down on his mind, fastened it there, and made it stay. He used to say: "When a man tells me that he forgot to do something, I tell him he might as well have said: 'I do not care enough about your business to take the trouble to think of it again.'" I once had an intelligent young man in my employment who deemed it sufficient excuse for neglecting any important task to say, "I forgot it." I told him that would not answer. If he was sufficiently interested he would be careful to remember. It was because he did not care enough that he forgot it. I drilled him with this truth. He worked for me three years, and during the last of three he was utterly changed in this respect. He did not forget a thing. His forgetting, he found, was a lazy, careless habit of mind, which he cured.—*Ex.*

Interesting Photography.—Miss Anna Bell Swayne of Kennett Square, who drove to West Chester on Thursday to attend the meet-

ing of the World's Fair Auxiliary Society, visited by appointment, in the afternoon, the residence of Dr. Alfred E. Baker, "Norwynden," East Bradford, and took a number of photographs of the place, differerent views being taken. Miss Swayne is arranging to take phototographs of a number of points of historic interest in Chester county, to be used in the exhibit of woman's work from this country. She has also consented to bring her camera to the next meeting of the society, in October, in order to photograph a number of the members, a memento to them of their work in the behalf of their country.

When the Corner-Stone of the Holy Trinity (Episcopal) church at the Southwest corner of Walnut street and Rittenhouse Square, Philadelphia, was laid thirty-five years ago, May 25th, 1857, beside the usual deposit of copies of the Holy Bible, Book of Common Prayer, and the newspapers and coins of the day, a number of photographic prints were deposited in the copper box before it was soldered up and placed in its final resting place. This innovation was made at the instance of Constant Guillou one of the earliest amateur photographers in Philadelphia, for the instruction and benefit of the photographic guild years hence, when the contents of the corner-stone of the sacred edifice should again come to the light of day.

The prints are all photographic copies of the architect's original drawings of the church, and are printed upon every kind and make of paper, and representing every process and manipulation then known or in use, each process and manipulation being carefully endorsed upon the print even to the smallest detail.

Early Daguerreotype Days.—The interesting series of historical papers published under above title in the *American Journal of Photography* are resumed this month. The non-arrival of the illustrations made it inexpedient to continue the text in the last number.

Punctuality.—One cannot begin too early in life to discipline himself to habits of the most exacting punctuality in keeping every engagement and the performance of service, be it little or great. Great men in all ages have been noted for punctuality. They believed an act to be well done must be done promptly.

Photographic Hints and Formulæ.

A Correction.—The New Platinum Process, by Ganichot.—An unfortunate typographical error crept into our journal of last month, notwithstanding the careful proof-reading to which every page is subjected. This is still more unaccountable from the fact that the formulæ were correct in the proof sheets passed by the editor. We would ask our readers to refer to the pages, and kindly make the corrections at the proper place, viz.

Page 491, the fifth line should read: Ferric chloride (dry), 125 grams. Twenty-first line: Chloro-platinate of Soda, 2.5 grams.

On page 492, sixth line: Oxalic acid, 25 grams.

How to Use Glue.—For glue to be properly effective, it requires to penetrate the pores of the wood, and the more a body of glue penetrates the wood the more substantial the joint will remain. Glue that takes the longest to dry is to be preferred to glues that dry quickly, the slow-drying glues being always the strongest, other things being equal. For general use no method gives such good results as the following: Break the glue up small, put into an iron kettle, cover the glue with water, and allow to soak twelve hours; after soaking. boil until done. Then pour it into an air-tight box; leave the cover off until cold; and then cover up tightly. As glue is required, cut a portion and melt in the usual way. Expose no more of the made-glue to the atmosphere for any length of time than is necessary, as the atmosphere is very destructive to made-glue. Never heat made-glue in a pot that is subjected to the direct heat of the fire or lamp. All such methods of heating glue cannot be condemned in terms too severe. Do not use thick glue for joints or veneering. In all cases work it well into the wood in a similar manner to what painters do with paint. Glue both surfaces of your work, excepting in the case of veneering. Never glue upon hot wood, or use hot cauls to veneer with, as the hot wood will absorb all the water in the glue too suddenly, and leave only a very small residue with no adhesive power in it.—*The Manufacturer and Builder.*

Photographic Scissors and Paste.

The Sound of Light.—One of the most wonderful discoveries in science that have been made within the last year or two is the fact that a beam of light produces sound, says the *American Art Journal.* A beam of sunlight is thrown through a lens on a glass vessel that contains lampblack, colored silk, or worsted, or other substances. A dish, having slits or openings cut in it, is made to revolve swiftly in this beam of light, so as to cut it up, thus making alternate flashes of light and shadow. On putting the ear to the glass vessel, strange sounds are heard so long as the flashing beam is falling on the vessel.

Recently, a more wonderful discovery has been made. A beam of sunlight is made to pass through a prism, so as to produce what is called the solar spectrum, or rainbow. The disk is turned, and the colored light of the rainbow is made to break through it. Now, place the ear to the vessel containing the silk, wool, or other material. As the colored lights of the spectrum fall upon it, sounds will be given by different parts of the spectrum, and there will be silence in other parts.

For instance, if the vessel contains red worsted, and the green light flashes upon it, loud sounds will be given. Only feeble sounds will be heard when the red and blue parts of the rainbow fall upon the vessel, and other colors make no sound at all. Green silk gives sound best in red light. Every kind of material gives more or less sound in different colors, and utters no sound in others. The discovery is a strange one, and it is thought more wonderful things will come from it.

That ether is capable of causing sad havoc when used in a careless manner, users of saturators are doubtless aware. About a fortnight ago a photographer in Paris dropped a jar of collodion ; his assistants immediately commenced to mop it up, but having omitted to open the windows, the fumes reached a stove in an adjoining room, and fired, with the result that the building took fire, and it was afterwards ascertained that two people lost their lives.

A Portable Lantern Frame and Screen.—Now that the lantern season is once more upon us, each one interested in lantern work will be busy preparing for the long winter evenings. For the benefit of those who are in want of a cheap, as well as a portable lantern-frame and screen, I herewith give particulars of one I have just made, and which anyone can make for themselves.

Procure one dozen ash broomsticks, plain, without turned-heads, at 3s. 6d. a dozen, 50 inches long. Get your local tinner to make 8 sockets, 6 inches long, to fit the broomsticks. Also 4 angle pieces same length for the corners. Vou can use the sticks full length, or cut them to 48 inches, and fit them to the sockets. Screw the sockets fast to one end of the sticks, leaving one end loose, to allow for taking to pieces for convenience in packing up.

When all the pieces are fitted together we will have a frame 12 feet square, or by leaving out one piece on each side, it will make an 8 foot frame, suitable for an ordinary room or small school. If all the pieces are sandpapered and varnished with oak varnish, it forms a nice frame, fit for any room or company.

Sheeting, suitable for showing lantern slides on, can be had from most drapery establishments. Mine is best strong bleached sheeting cotton, 108 inches wide. Procure some of same quality about 40 inches wide, cut it down the centre; this will give two pieces of proper width for sewing to either side of the wide piece. Next, make a hem at one end, and on one side, wide enough to allow the poles to slip through, and put tapes on the opposite sides of the hems. This forms a frame and sheet which can be put together in a few minutes by anyone, and packed up as readily.—*George Kilburn in Optical Magic-Lantern Journal.*

He (on the shore with a camera, meeting a girl)—"Ah, I beg your pardon; may I take you?"

She (with eagerness, but blushing)—"Yes, I'm perfectly willing; but you'll have to ask papa first."

A friend of ours, whose name will be unmentioned, thinks of forming a full band in his own person. Being a good violinist and an admirable person for any instrument requiring wind, he is now going as a drummer for a photographic stock house. We have no doubt he will be well received.

We shall never smile again until we exchange photographs with the young man that put shoemaker's wax on the benches of the front portico of this office.—*Easton Free Press.*

For Ice Cream Eaters.—A raw onion chewed slowly and swallowed without undue haste will destroy the odor of ice cream from the breath.—*Texas Siftings.*

Minneapolis Camera Club.—A lantern slide exhibition by the members of the club, together with an informal discussion of the various methods of development was held at the club rooms on Wednesday, Oct. 2. The meeting was attended by the members and their friends.

Platinum Mines of Russia.—The platinum beds of the Ural Mountains, according to the *Journal de la Chambre de Commerce de Constantinople*, "are the only ones in the world in which this metal is found in grains. Platinum is found in Brazil and in the Cordilleras in the hard serpentine rocks, but never in the form of grains. The platinum beds of the Ural Mountains are found in various districts. In the north, at Besserski, in the Government of Perm, in the District of Knotourski, and in the State properties of Goroblagodatski, where 66 mining concessions have been granted. All the beds of the nothern region are situated in the basin of the river Touri, in that of the tributary stream of Taghil, and in other tributaries higher up. On the western declivity of the Ural Mountains there is another platinum bed near the river Outka, a tributary of the Tchoussova, and the basins of the higher tributaries of the Outka, near the Ural river. The platinum found in these places is in the form of grains, in sand frequently containing gold. The weight of these grains is from 17 to 21 grams to every 1640 kilograms of sand.

Hours of Gloom.—To every man there are dark hours when he feels inclined to abandon his best interests—hours when his heart's dearest hopes appear delusive. Hours when he feels unequal to the burden, when all of his aspirations seem worthless. Let no one think that he alone has dark hours. They are the common lot of humanity. They are the touchstone to try whether we are current coin or not.

Marrying by Photograph.—A prosperous Slavonian rancher in the south end of the Huachuca mountains some time ago visited his native land, and found a large number of worthy young ladies among his acquaintances who would be only too happy to find homes and husbands in this land of progress and liberty. Securing the photographs of a number of these young ladies, he brought them back with him, and lost no opportunity to show them to his bachelor friends and neighbors. He told them that he had the promise of these young ladies that they would come to America and marry the man he would recommend, and as a consequence, a great many of his neighbors have excellent wives, each one selecting his choice from the photographs.

In the Twilight Hour.

A HOUSE is no home unless it contain food and fire for the mind as well as for the body.—*Margaret Fuller Osseli.*

SOME people are always grumbling because roses have thorns. I am thankful that thorns have roses.—*Alphonse Karr.*

"MUSIC is the link which binds earth to heaven. It strengthens faith, brightens hope, and fills the heart with joy."

IF a man can write a better book, preach a better sermon, or make a better mouse-trap than his neighbor, though he builds his house in the woods, the world will make a beaten path to his door.—*Emerson.*

TRUE FRIENDSHIP—one soul in two bodies.—*Pythagoras.*

KINDNESS—a language which the dumb can speak, and the deaf can understand. —*Bovee.*

"CHARITY is a precious coin dropped into the hearts of men from the mint of heaven."

"HAPPINESS is a perfume you cannot pour on others without getting a few drops yourself."

HABIT is a cable; we weave a thread of it every day, and at last we cannot break it.—*Horace Mann.*

HUMAN doctrines cannot cure a wound in the conscience. The remedy is too weak for the disease. Conscience, like the vulture of Prometheus, will still lie gnawing, notwithstanding all that such doctrines can do.

WHAT you have at your death, let it be without controversy, else the lawyers will be your heirs. *Osborne.*

THE choicest buildings have the lowes, foundations.

INTEREST is the spur of the people, but glory that of great souls.—*J. J. Rousseau.*

THE reason why so few marriages are happy is because young ladies spend their time in making nets, not in making cages. —*Swift.*

PREJUDICES are notions or opinions which the mind entertains without knowing the grounds and reasons of them, and which are assented to without examination. —*Bishop Berkeley.*

NO ashes are lighter than those of incense, and few things burn out sooner.—*Landor.*

MEN are every day saying and doingt from the power of education, habit and imitation, what has no root whatever in their serious convictions.—*Channing.*

THE greatest friend of truth is time; her greatest enemy is prejudice, and her constant companion is humility.—*Colton.*

SOME men are more beholden to their bitterest enemies than to friends who appear to be sweetness itself. The former frequently tell the truth, but the latter never.—*Cato.*

THERE is no funeral so sad to follow as the funeral of our own youth, which we have been pampering with fond desires, ambitious hopes, and all the bright berries that hang in poisonous clusters over the path of life.—*Bossuet.*

ALL nobility in its beginnings was somebody's natural superiority. *R. W. Emerson.*

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